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LASER WINDOW TEST APPARATUS OPERATION AND MAINTENANCE MANUAL (F--ETC(U)

MAY 75

F29601-73-C-0124

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AFWL-TR-75-150-VOL-3

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1 of 2
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1 OF 2

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LASER WINDOW TEST APPARATUS
OPERATION AND MAINTENANCE MANUAL
(For the Test and Evaluation of Optical Components
for the Airborne Laser Laboratory)

VOLUME III
CIRCUIT DIAGRAMS AND SCHEMATICS

MAY 1975

Prepared for the
Air Force Weapons Laboratory (LRE)
Kirtland Air Force Base
Albuquerque, New Mexico 87117

Under
Data Item A010
Contract F29601-73-C-0124



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FOREWORD

The material contained in this volume is called for as Item A010 of Exhibit A to Contract F29601-73-C-0124, "Test and Evaluation of Optical Components for the Airborne Laser Laboratory." Capt. John Loomis/LRE, Air Force Weapons Laboratory, Kirtland AFB, NM, 87117, served as project officer.

The basic information for this document was prepared by the technical staff of the University of Dayton Research Institute assigned to the project. It is to be noted that this document is Volume III of the four-volume LWTA Operations and Maintenance Manual, the other three of which are identified as:

- Volume I Description and Principles of Operation
- Volume II Setup, Alignment, Calibration, and Operation
- Volume IV Operations, Software Programs, and Listings

This manual is intended as a working document in that it is designed to be constantly in use; and to be modified, changed, or upgraded as conditions warrant. The format for this document (Volume III), therefore, is such that updating modifications can be made directly to the circuits/wiring sketches herein so that correct information is always available, and that costly mistakes can be avoided. For example; information is only presented on one side of each page, and this document is bound in such a manner as to make all pages herein readily replaceable.

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SECTION 1

INTRODUCTION

1.1 SCOPE

This volume contains schematic diagrams and cable connection drawings for the Laser Window Test Apparatus (LWTA), which has been installed at the Air Force Weapons Laboratory as part of the Laser Window Evaluation Laboratory. The LWTA was constructed by the University of Dayton Research Institute under Contract No. F29601-72-C-0122, and was operated during the reporting period under Contract No. F29601-73-C-0124, for the purpose of evaluating infrared (IR) windows and other components in support of the Airborne Laser Laboratory (ALL) development program. The LWTA is installed in Room 100, Building 418, Kirtland Air Force Base, New Mexico, as an integral part of the Laser Window Evaluation Laboratory.

It should be noted that the LWTA is a highly complex and flexible scientific instrument system. As such, it is expected to undergo constant evolutionary changes during its operating lifetime. This documentation, therefore, is written to describe the configuration of the apparatus as it existed at the end of January 1975.

This section of this volume explains the contents and organization of the remainder of the volume; and it provides instructions, in the form of tables and illustrations, on how to find a particular drawing or diagram. Section 2 herein, contains those referenced drawings and diagrams. To be of greatest possible use to the reader, it is intended that this volume be used in conjunction with Volume II, which discusses routine operating instructions -- including loading, setting up, manual manipulation, and automatic operation of the apparatus. The other volumes in this series are identified in the Foreword.

1.2 ORGANIZATION OF DIAGRAMS

This subsection contains the "how to" discussions -- relating how to find a circuit, drawing, etc. within the remainder of the document; by reference to Chassis or Groups, or by reference to the index of Circuits and Components.

1.2.1 Chassis Numbering Scheme

Each subassembly that is part of the electronics package of the LWTA has been given a "black box" or chassis number, which was determined from its relationship with various functional groups. Figures 1-1 and 1-2

present block diagrams of the photometer and interferometer circuitry to show these groupings. The significance of these groupings is as follows:

<u>Number Series</u>	<u>Function or Description</u>
100	Components mounted in control console electronics rack
200, 300	Interconnecting cables between control room and optics room
400	Numerical Control
500	Joystick
600	Photometer preamplifier
700	Calibration mirrors, photometer
800	Interferometer X-Y encoders
900	Photometer beam dump
1000	Wavetek CRT unit interconnections
1100	Computer-controlled power bus
1200	Environmental and table-position controls and sensors
1300	Power panel
1400, 1500	Operator manual intervention
1600	Replaced by 2000
1700	Interferometer Doppler mirror drive
1800	Interferometer detectors and preamplifiers
1900	Audible/visual alarm circuit
2000	Sync pulse generator and chopper drives

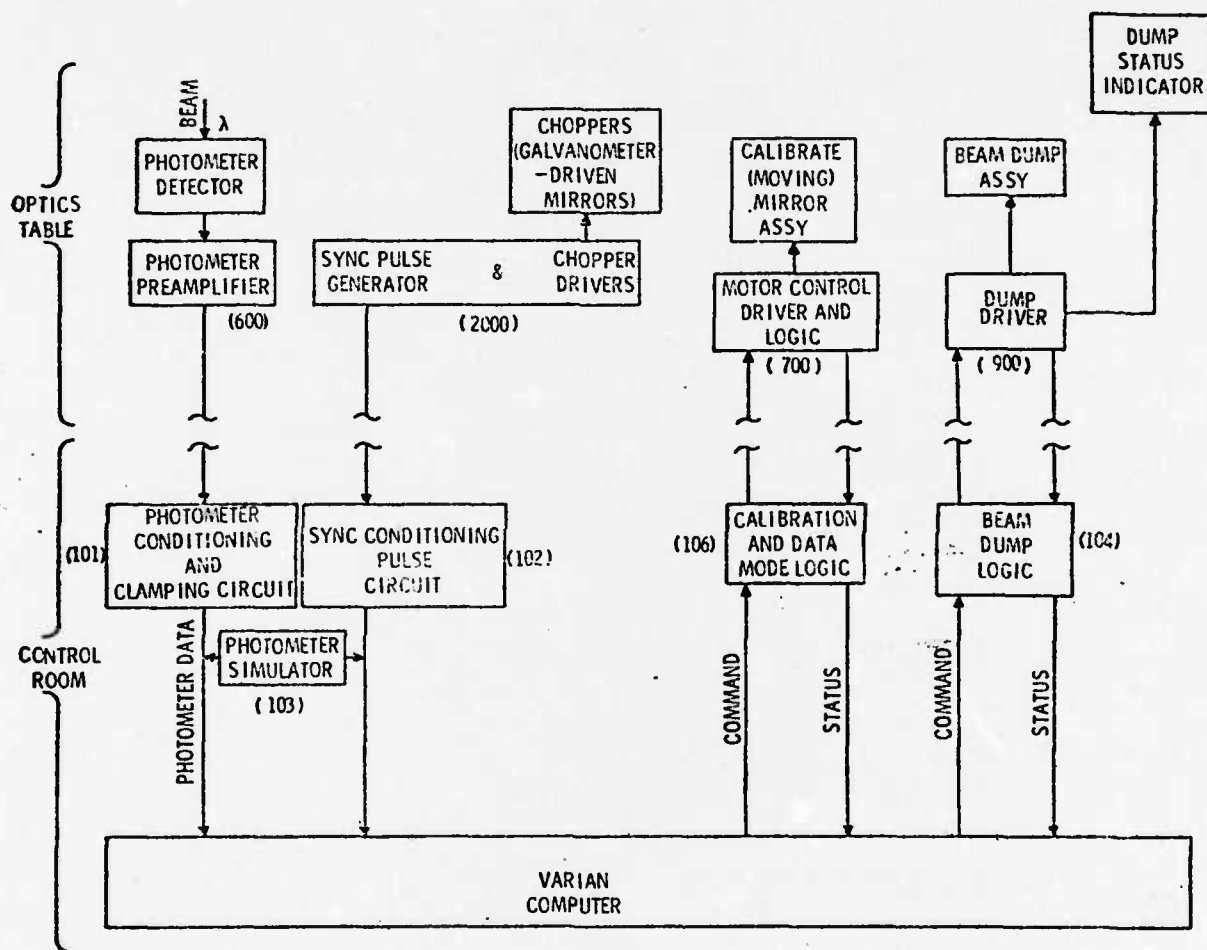


Figure 1-1. Photometer Electronics Block Diagram.
(Numbers in Parentheses are Chassis Numbers.)

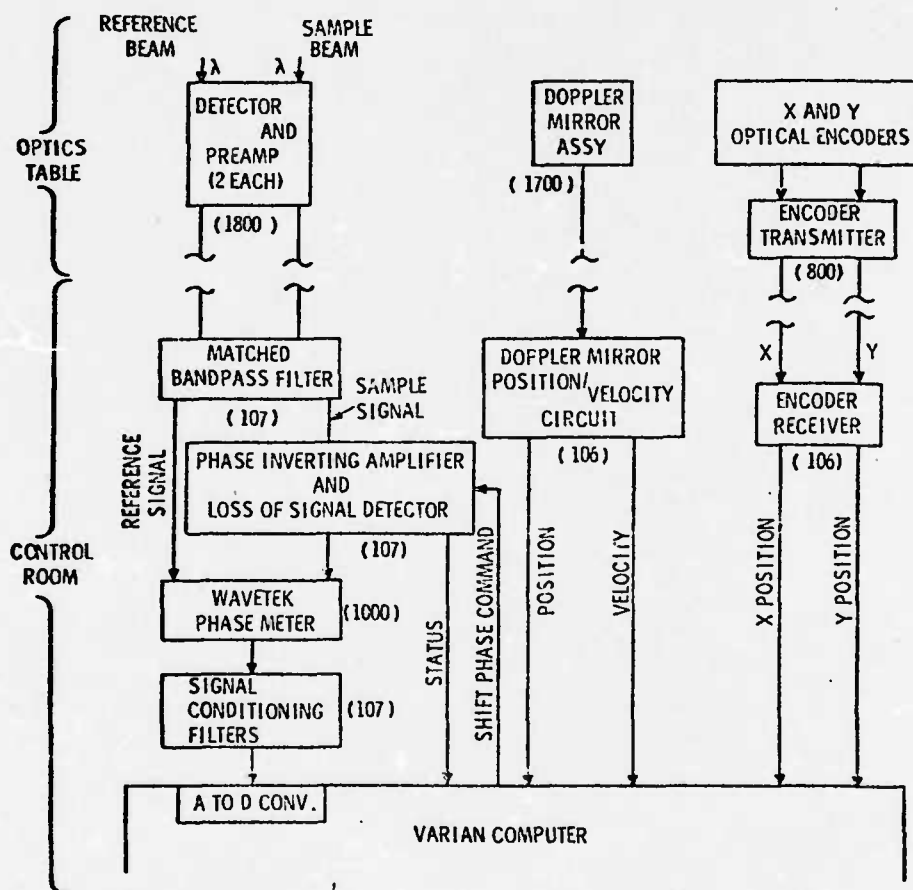


Figure 1-2. Interferometer Electronics Block Diagram.
(Numbers in Parentheses are Chassis Numbers.)

1. 2. 2 Arrangement of Groups

The wiring and interconnecting information related to each of the previously referenced groups is contained in Section 2. The first page within each group has been reproduced on colored paper, so that that group can more easily be located within the volume. The diagrams within each group are arranged in numerical order, by chassis number.

Chassis numbers are also assigned to cable connectors, even where there are cable-to-cable connections with no electronic components are involved. One cable connector drawing may have several numbers, such as "P/J201, P/J301," which is interpreted as follows, "P" and "J" refer to a plug and a jack, respectively. Plugs and jacks may either be mounted to a panel or box, or they may be attached to the end of a cable. When two or more numbers are indicated (as in the example), it means that those connections are wired one-to-one in a series (similar to extension cords), between the components that they service.

An index of circuit descriptions, with their corresponding chassis numbers and beginning page numbers, appears in Table 1-1. Figure 1-3 is a layout diagram that shows the relative locations of those major cable connectors that are the main communication lines between the control room and the optics room.

1. 2. 3 Arrangement Within Groups

Although the arrangement within groups may vary somewhat, the basic arrangement of most groups (in Section 2) consists of a block diagram for the related chassis (and the numbering assigned); followed, in turn, by applicable terminal board or connection diagrams, schematics, circuit diagrams, and supplementary information, where required.

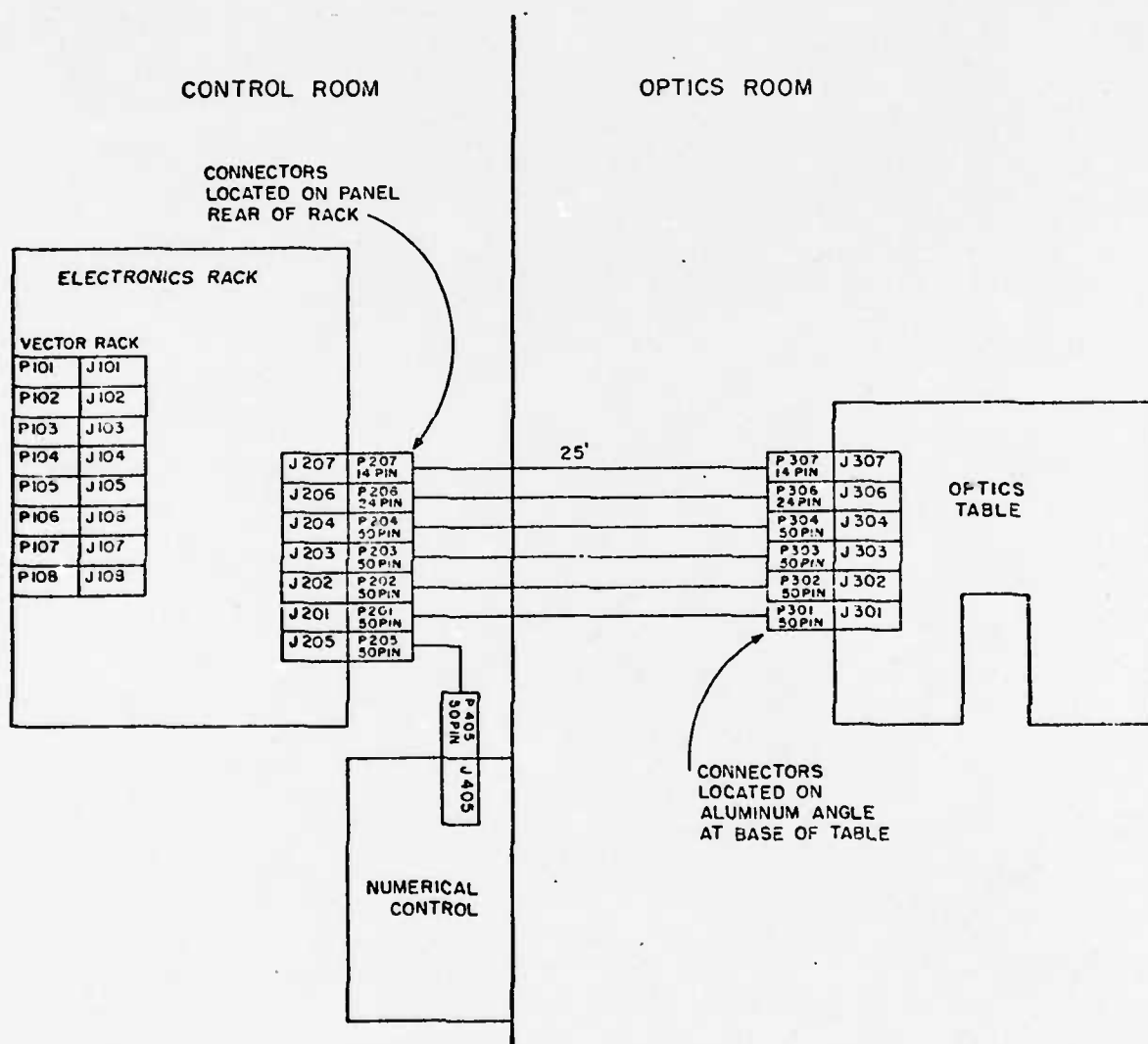


Figure 1-3. Locations of Major Cable Connections.

TABLE 1-1. INDEX OF CIRCUITS AND COMPONENTS

<u>Circuit Description or Location of Connector</u>	<u>"Black Box" or Chassis Number</u>	<u>Page</u>
Vector Rack Components of Control Console	100	2-1
Photometer Conditioning, Servo Unit	101	2-2
Photometer Quad & Frame Sync Pulse Delay Adjustments, Photometer Digital Oscilloscope	102	2-4
Photometer Simulator	103	2-8
System DVM, Channel 16, Photometer Beam Dump and Joystick Interfaces	104	2-11
Environmental Controls: Liquid N ₂ Low room Temperature warning, Cooling Water Failure, Table Out of Level	105	2-13
Interferometer Doppler Mirror Position & Velocity; Photometer Cal & Data Mode Mirror Drivers Interface, X-Y Encoder Interface	106	2-15
Interferometer Conditioning, BP Filter, LP Filter, Phase Shift Circuit, Loss of Signal Circuit	107	2-18
Rear Panel Connector to Optics Table	200	2-24
Connector Channel at Optics Table	300	2-24
Numerical Controller	400	2-30
Joystick Box	500	2-38
Photometer Preamplifier	600	2-45
Photometer Cal/Data Mode & Mirror Driver	700	2-47
Interferometer X-Y Encoders	800	2-52
Photometer Beam Dump	900	2-56
Interferometer/Wavetek Panel	1000	2-62
Computer - Controlled Power Bus	1100	2-64
Environmental Alarm System	1200	2-73

TABLE 1-1 (Continued)

<u>Circuit Description or Location of Connector</u>	<u>"Black Box" or Chassis Number</u>	<u>Page</u>
Rack-Mounted Power Supply Panel (24-Volt General Purpose Power Supply) Logic Power Supply Panel (Console 5V Power Supply), Operator Manual Inter- vention Circuit	1400, 1500	2-80
Doppler Mirror	1700	2-83
Interferometer Reference/Sample Detector Circuitry	1800	2-86
Audible/Visual Alarm	1900	2-90
Quad & Frame Sync Chassis (Replaces 1600 Series)	2000	2-93

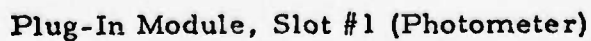
1.4

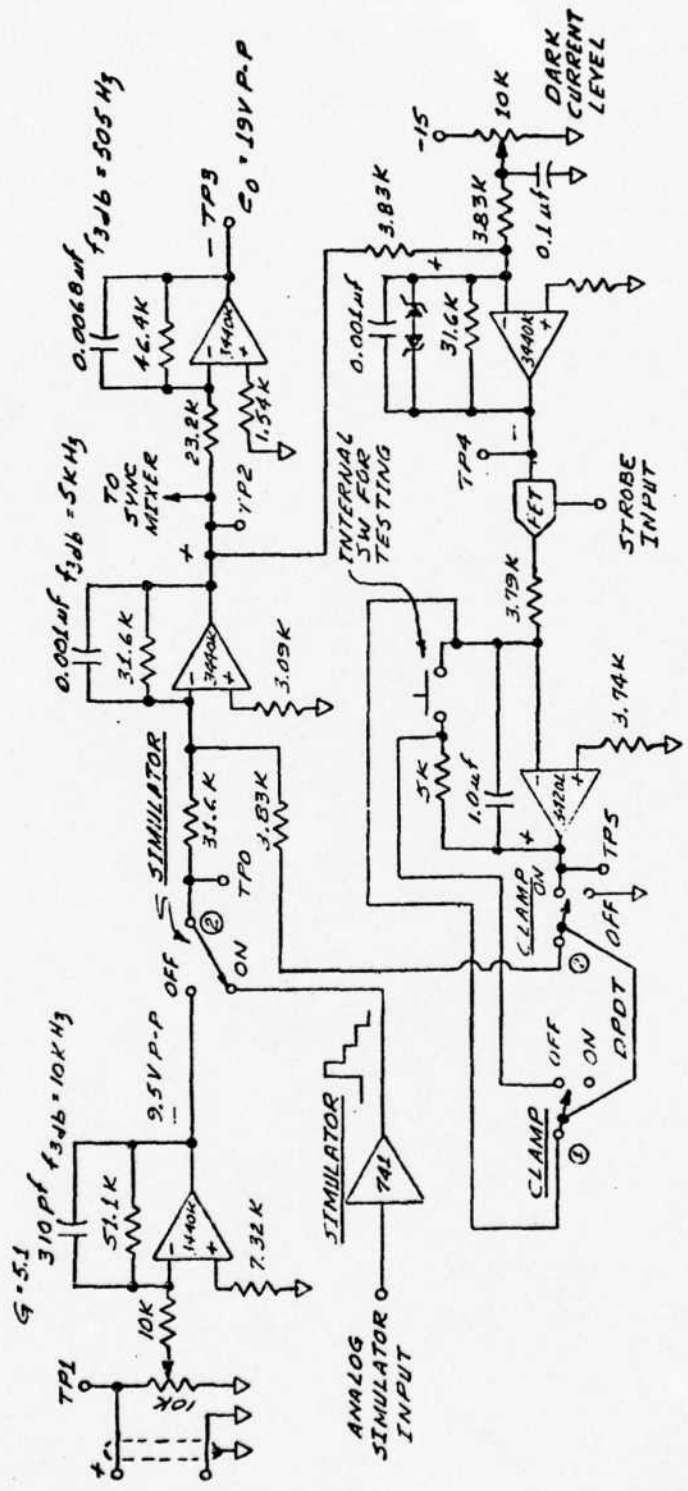
HOW TO USE THE DIAGRAMS

To trace a signal from end to end, start at the "black box" end and work back toward the control room. For example, the photometer beam dump circuit is chassis 900. All the connectors associated with this circuit will have numbers in the 900-series, such as 901, 902, etc. The schematics, wiring diagrams, and connection diagrams for the series will show the origin of the signal and the terminal number of the first connector traversed by the signal. The block wiring diagram for the 900-series will show the path to a main connector (usually a 200/300 series). Locate that connector by its number in Section 2 of this volume, and find the to-and-from connection for the signal being traced. This will show the terminal number of the ultimate destination of the signal.

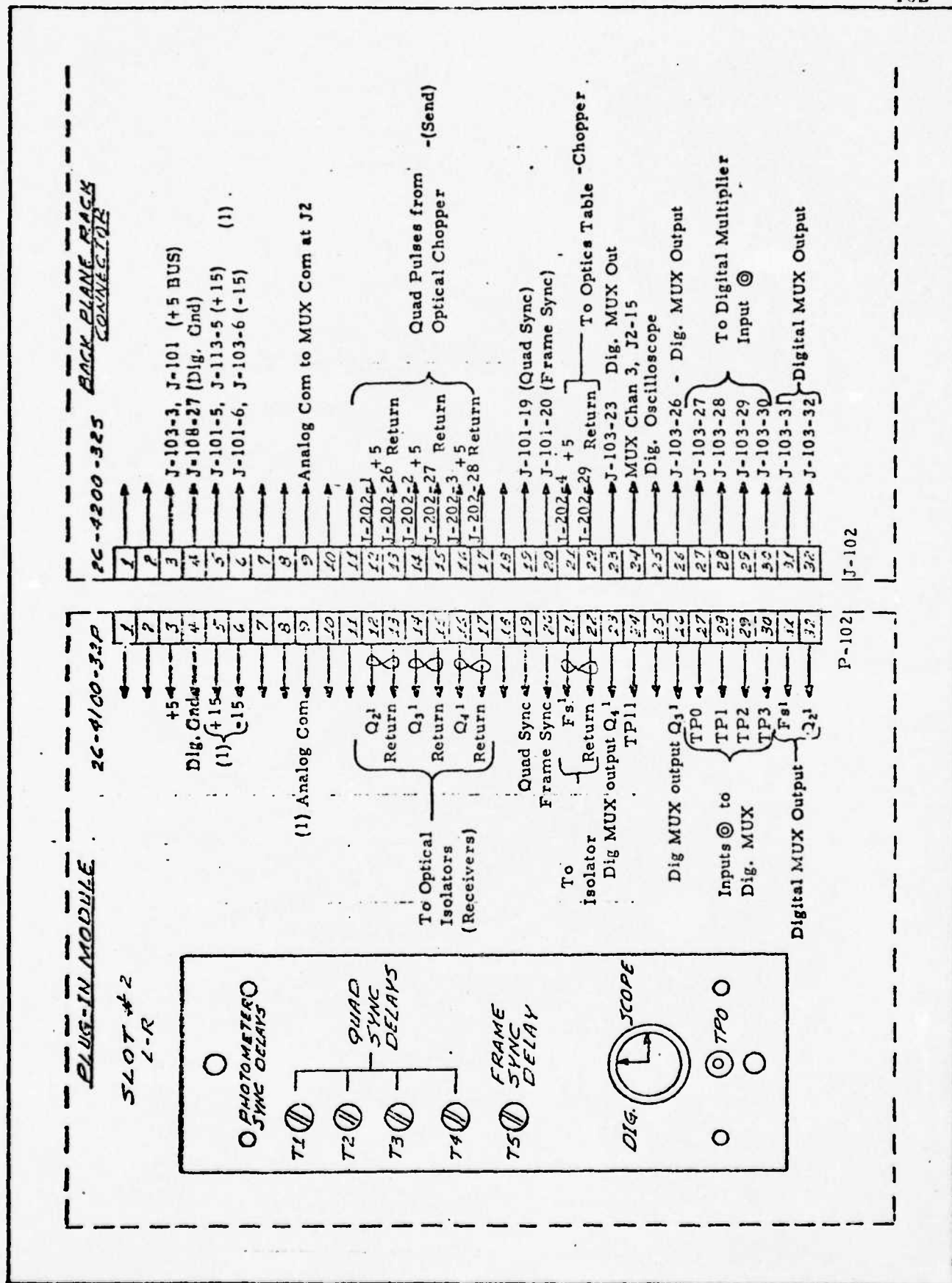
SECTION 2
DIAGRAMS

2.1 **COMPONENTS MOUNTED IN CONTROL CONSOLE**
VECTOR RACK (100 SERIES)

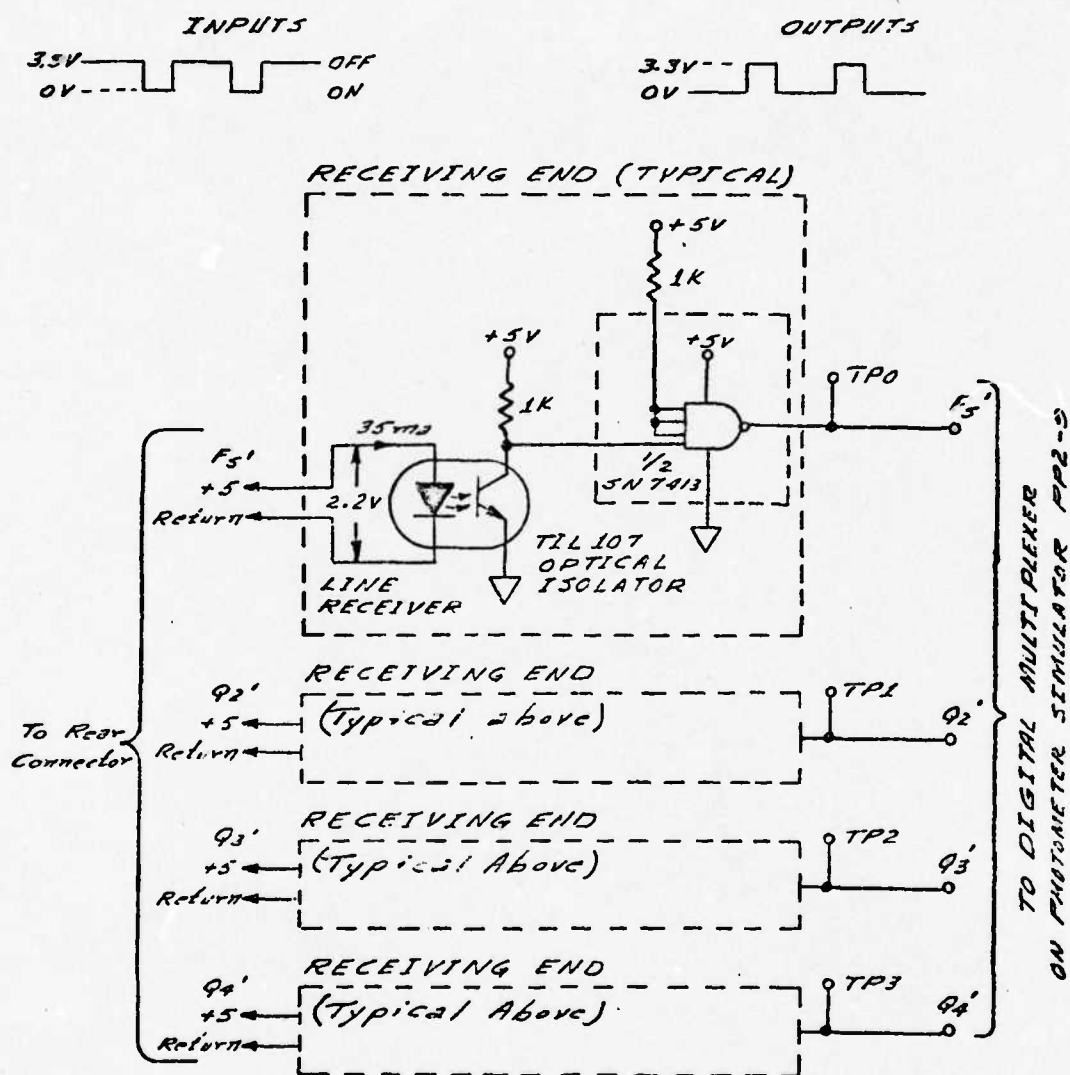




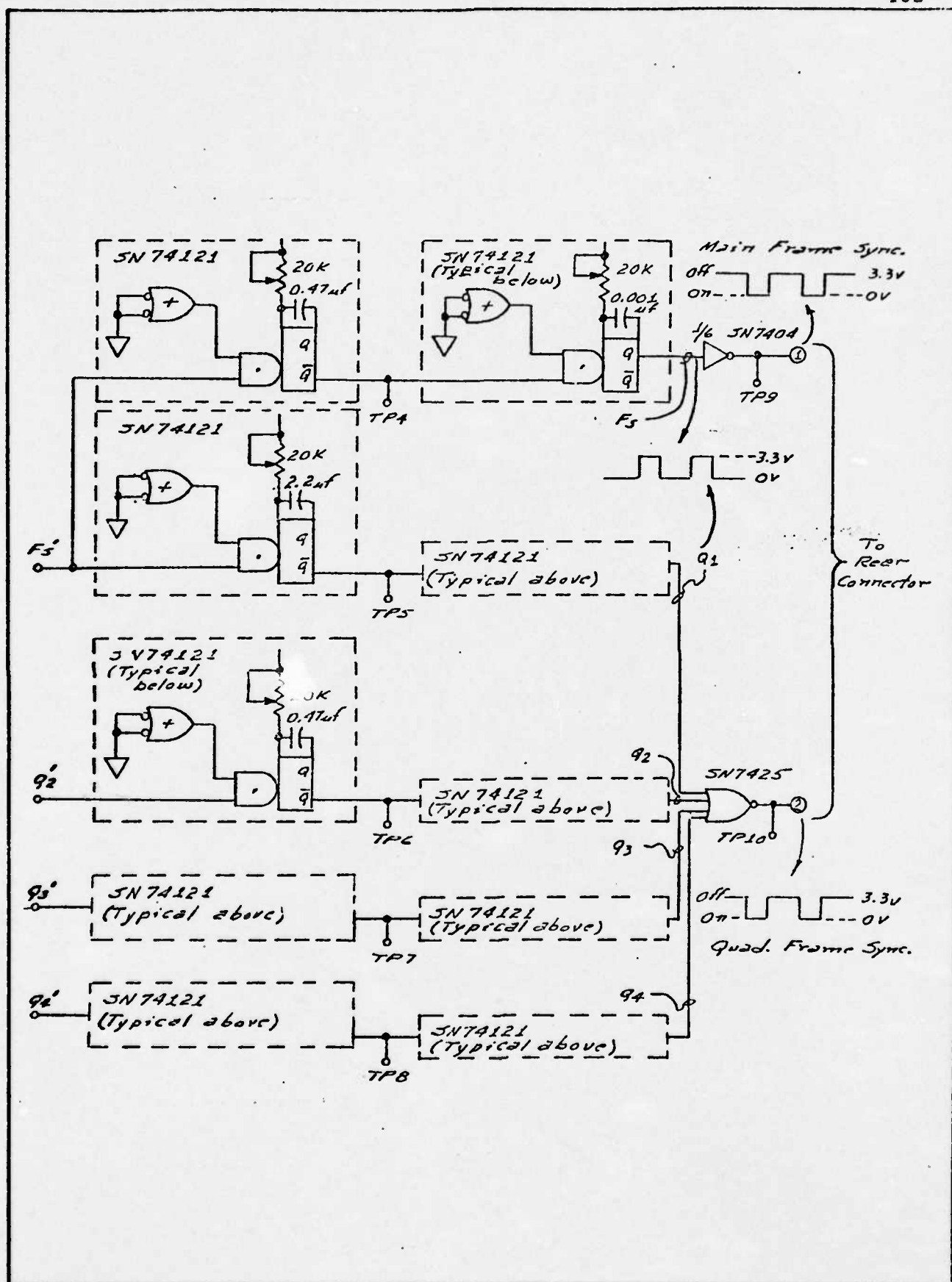
- NOTES:
1. Use DPDT Gold Plated Switches
 2. Use Single Point Ground
 3. Bring TP3 to Front Panel for Test Point



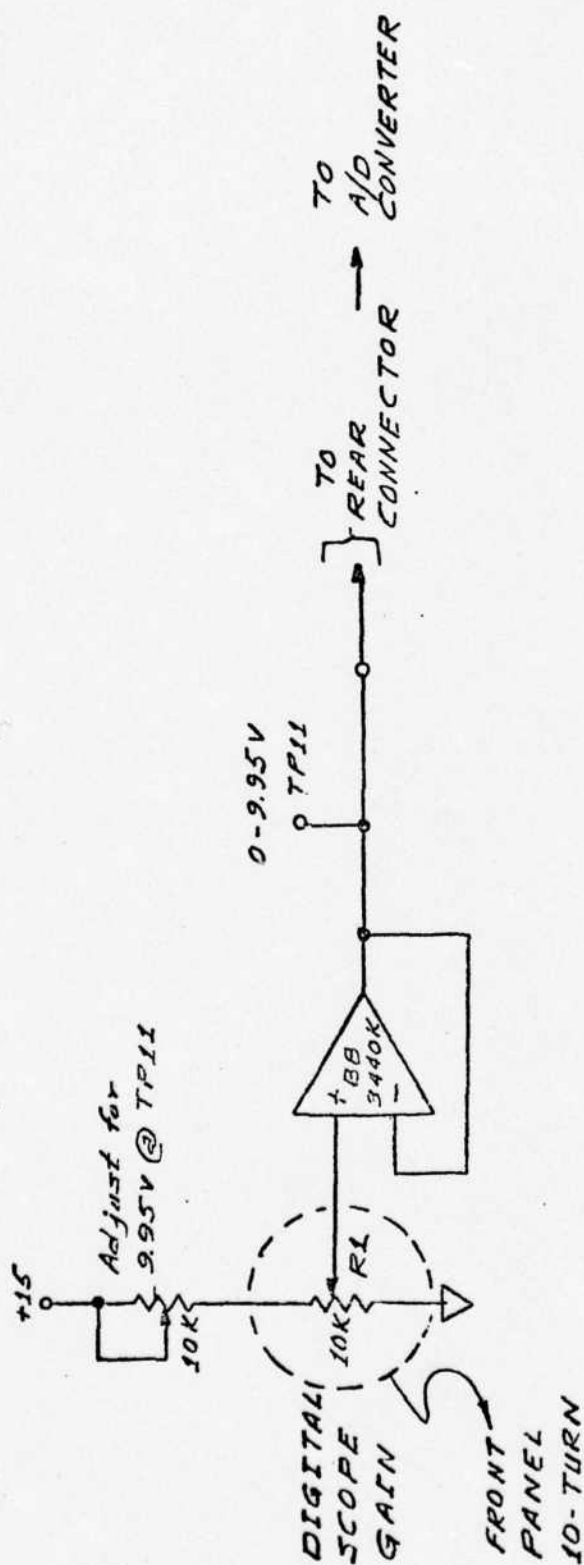
Plug-In Module, Slot #2 (Photometer Sync Delays)



Photometer Quad and Mainframe Syncs (Sheet 1 of 2)

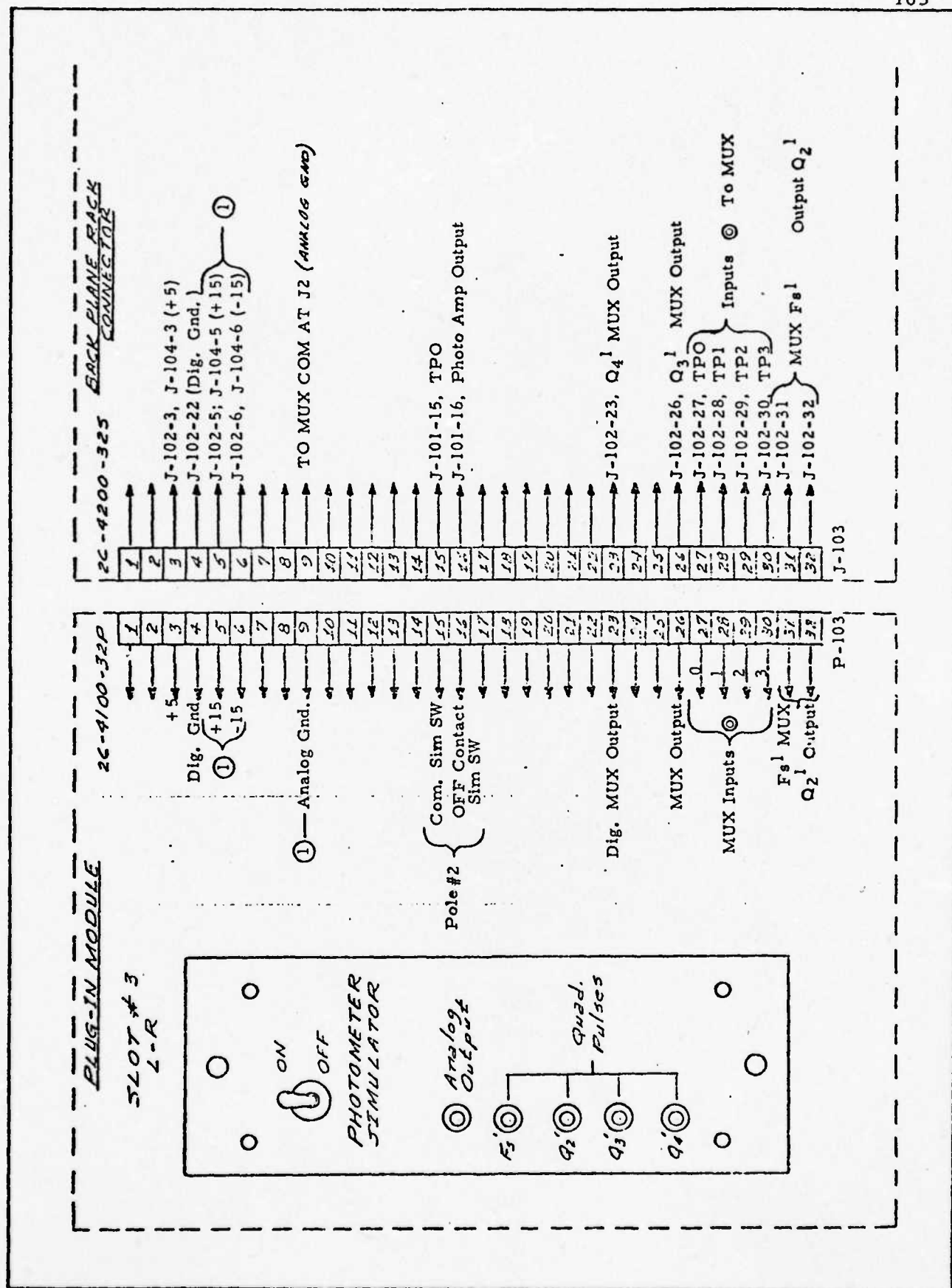


Photometer Quad and Mainframe Syncs (Sheet 2 of 2)

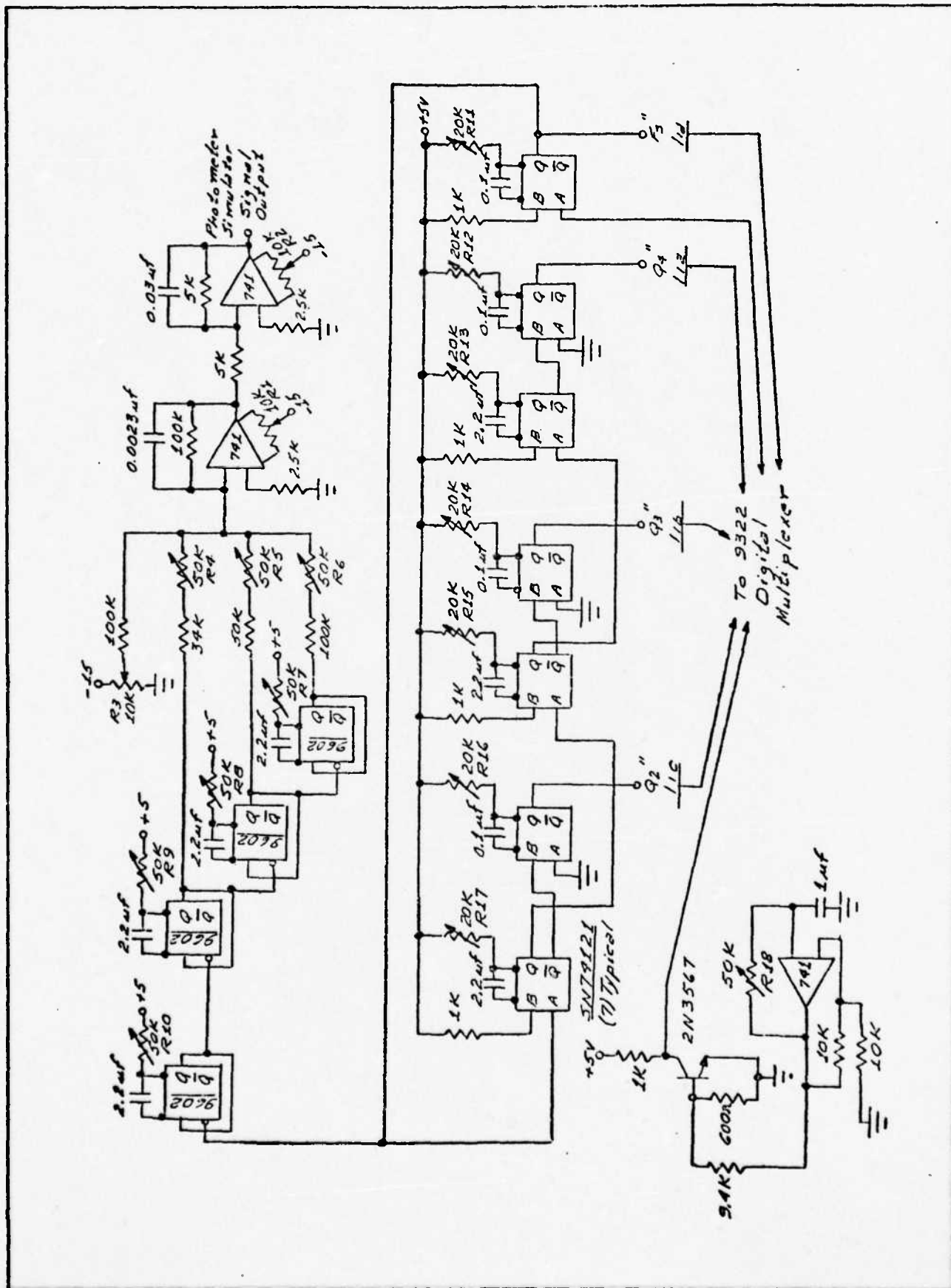


NOTE:
AWG22 for Analog Wiring

Digital Oscilloscope Input



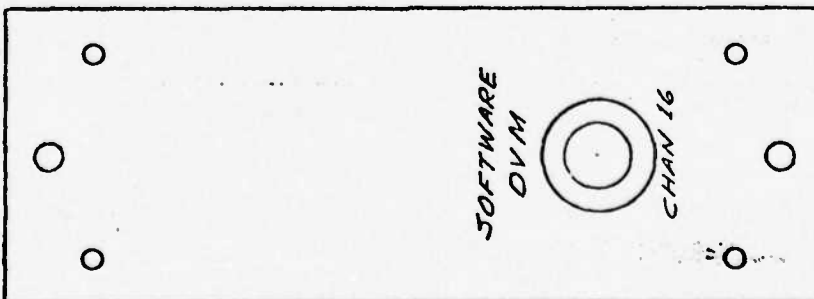
Plug-In Module, Slot #3 (Photometer Simulator)



Photometer and Quad Sync Simulator, 13 Hz Clock

PLUG-IN MODULE

SLOT # 4
BEAM DUMP and JOYSTICK
INTERFACE and SOFTWARE DVM



2C-4100-32P

1	1
2	2
3	3
4	4
5	5
6	6
7	7
8	8
9	9
10	10
11	11
12	12
13	13
14	14
15	15
16	16
17	17
18	18
19	19
20	20
21	21
22	22
23	23
24	24
25	25
26	26
27	27
28	28
29	29
30	30
31	31
32	32

P-104

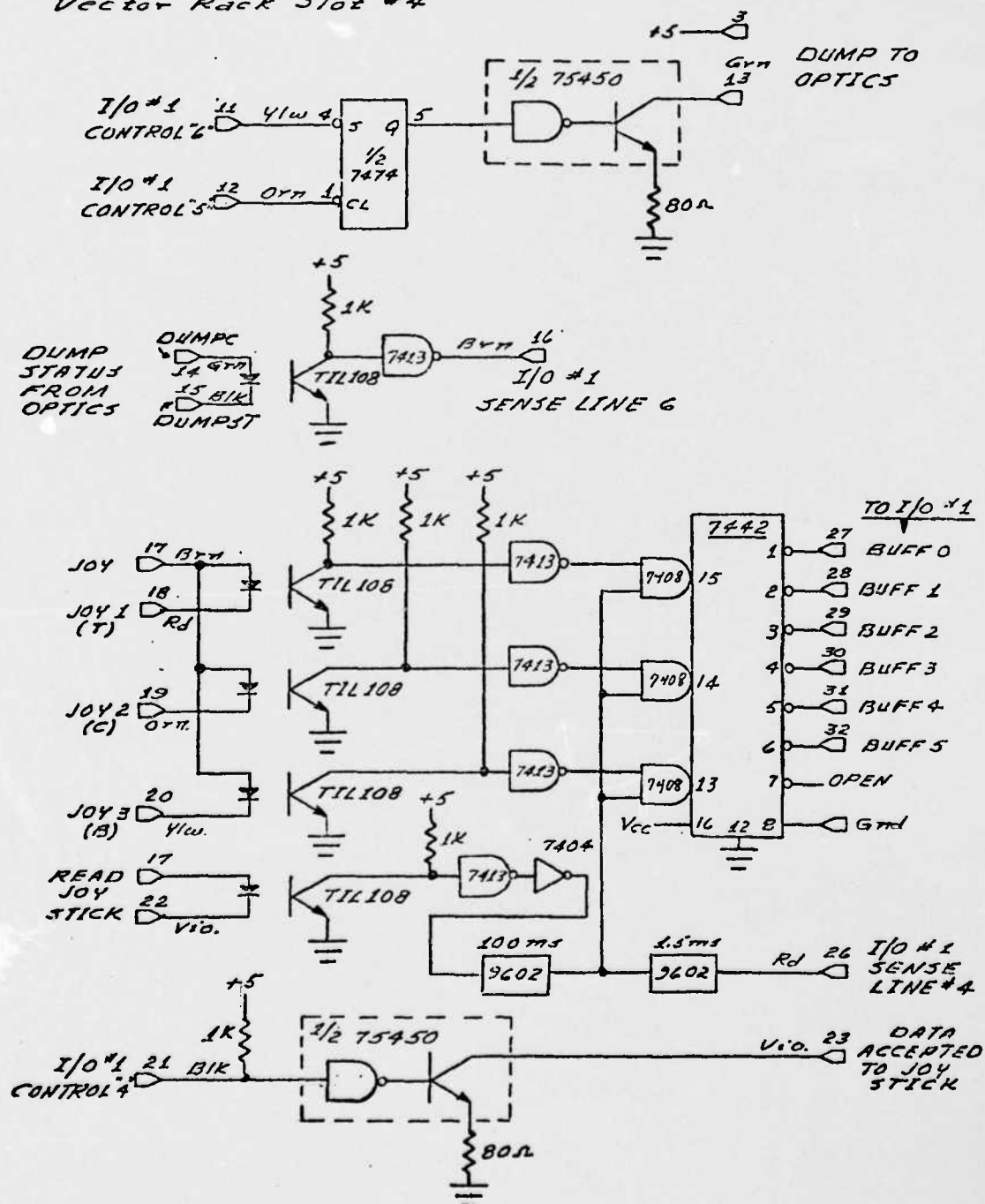
2C-4200-32S BACK PLANE RACK CONNECTOR

1	1
2	2
3	3
4	4
5	5
6	6
7	7
8	8
9	9
10	10
11	11
12	12
13	13
14	14
15	15
16	16
17	17
18	18
19	19
20	20
21	21
22	22
23	23
24	24
25	25
26	26
27	27
28	28
29	29
30	30
31	31
32	32

J-104

Plug-In Module, Slot #4 (Beam Dump and Joystick
Interface and Software DVM)

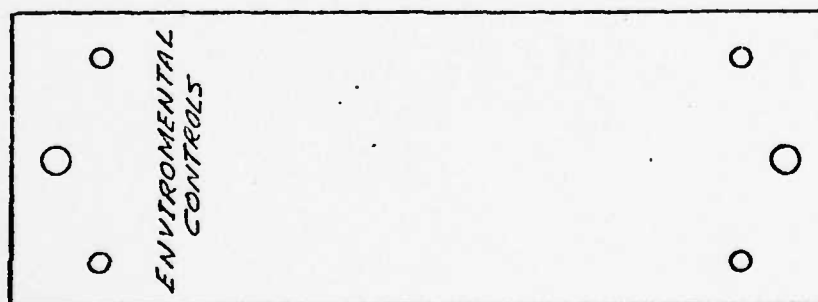
Vector Rack Slot #4



Beam Dump and Joystick Interface

PLUG-IN MODULE

SLOT #5
L-R



2C-4100-32P

1	Spare {
2	+5
3	
4	Dlg. Gnd.
5	Spare {
6	+15
7	-15
8	
9	Spare
10	Analog Gnd.
11	
12	Spare {
13	
14	
15	① Liquid N ₂ Low
16	② Room Temp Warning
17	③ Cooling Water Failure
18	④ Table out of Level
19	
20	System Warning Interrupt
21	
22	① LNLC
23	LNLC
24	③ CWFC
25	CWFC
26	② RTWC
27	RTWC
28	④ TOLC
29	TOLC
30	
31	Spare {
32	

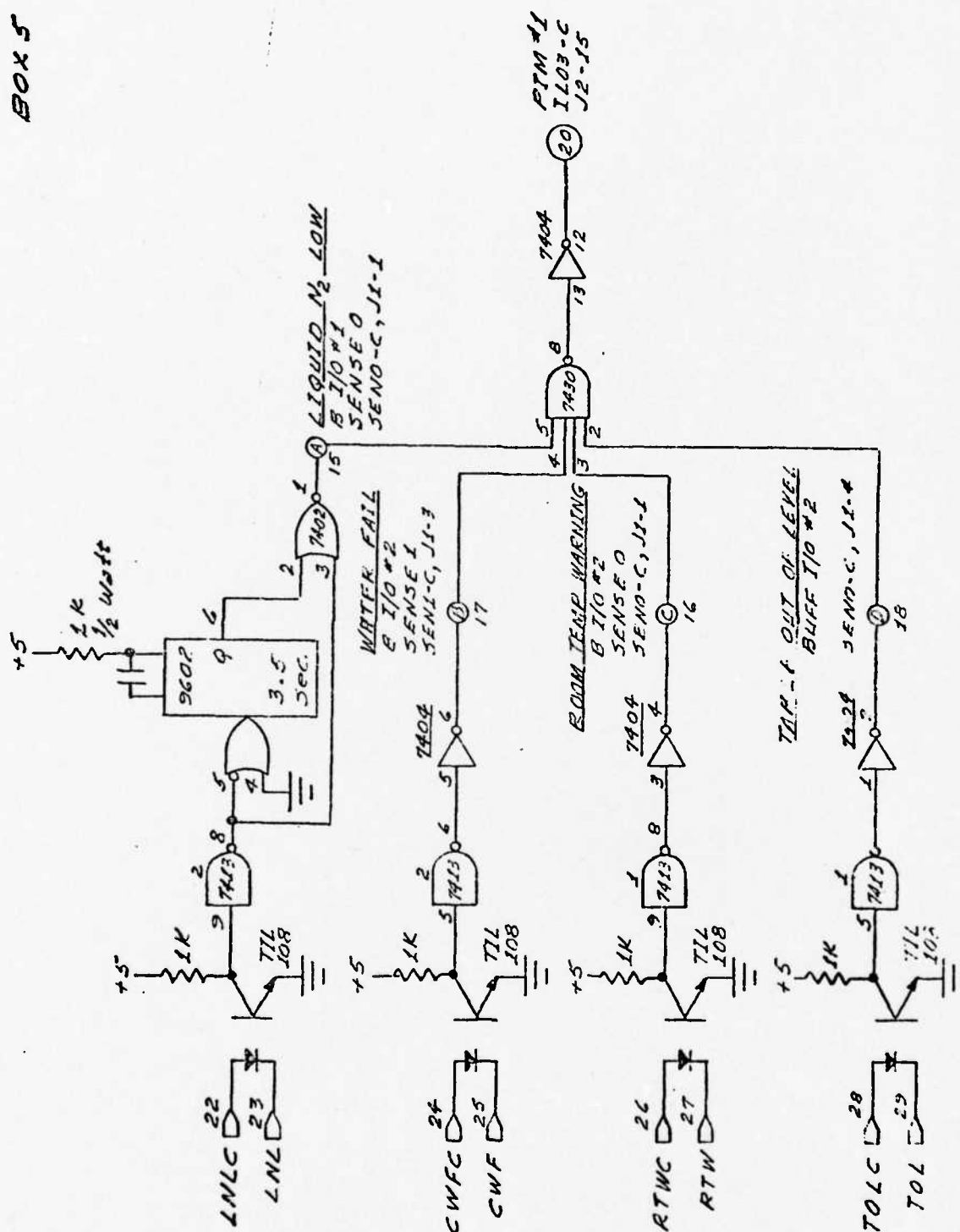
P-105

2C-4200-323 BACK PLANE RACK CONNECTOR

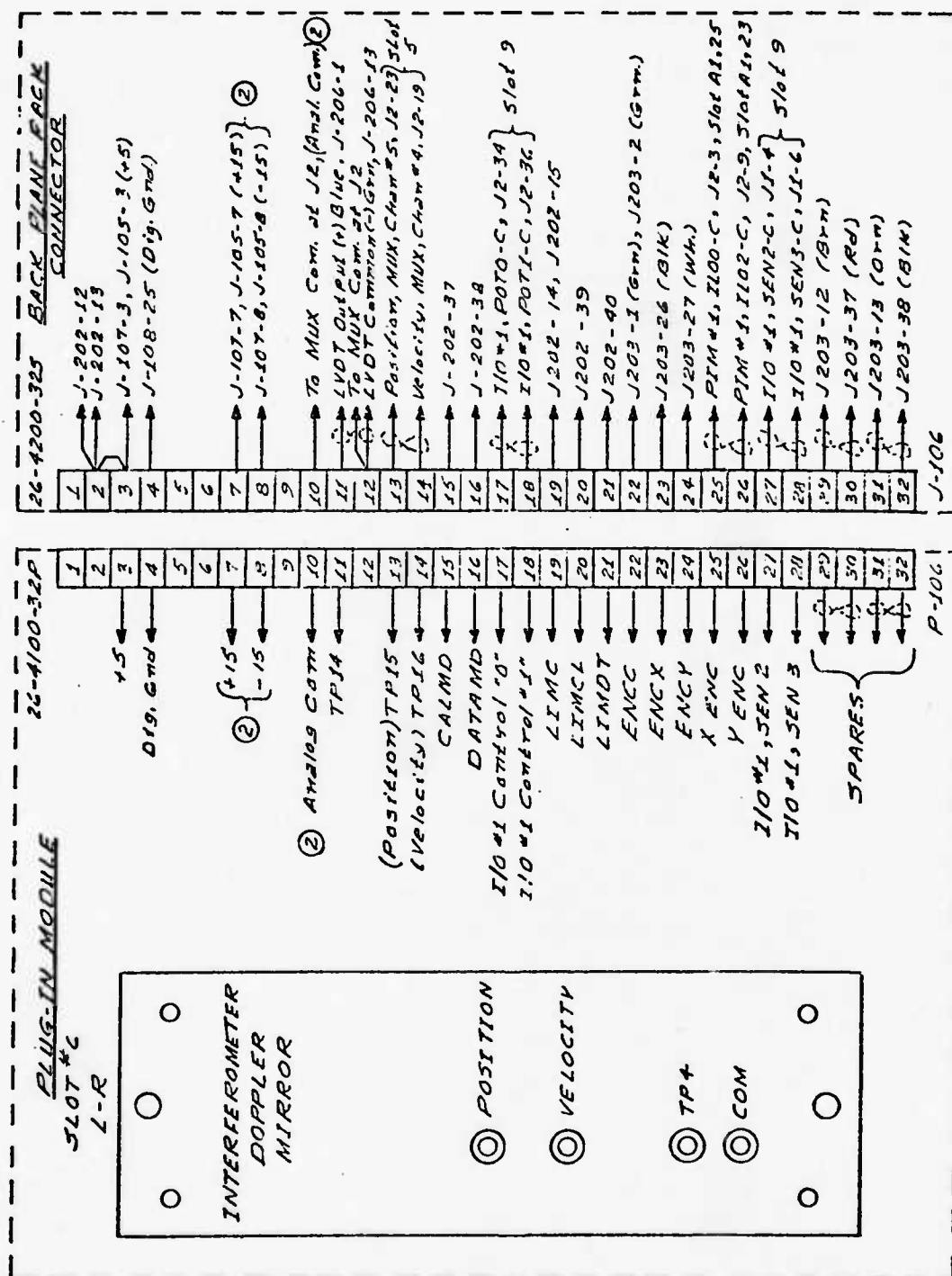
1	J-203-14 (Bn)
2	J-203-39 (Bk)
3	J-106-3, J-104-3 (+5)
4	J-108-28 (Dig. Gnd.)
5	J-203-15 (Ye)
6	J-203-40 (Bk)
7	J-106-7 (+5), J-206-6, 18
8	J-106-8 (-15), J-206-7, 19
9	Pim #2, IL02-C, J2-9, A2, Slot #7
10	To MUX Gnd. at J2 (Analog Com)
11	J-203-7 (Wh)
12	J-203-32 (Bk)
13	J-203-8 (Rd)
14	J-203-33 (Gn)
15	I/O #1, Sen0-C, J1-1, A2, Slot #9
16	I/O #2, Sen0-C, J1-1, A2 Slot #12
17	I/O #2, Sen1-C, J1-3, A2, Slot #12
18	I/O #2, Sen2-C, J1-4, A2, Slot #12
19	
20	Pim #1, IL03-C, J2-15, A1, Slot #25
21	J-203-9 (Rd)
22	J-203-3 (Rd)
23	J-203-28 (Or)
24	J-203-4 (Rd)
25	J-203-24 (Ye)
26	J-203-5 (Gn)
27	J-203-30 (Bk)
28	J-203-6 (Bl)
29	J-203-31 (Bk)
30	J-203-34 (Bl)
31	J-203-10 (Rd)
32	J-203-35 (Wh)

J-105

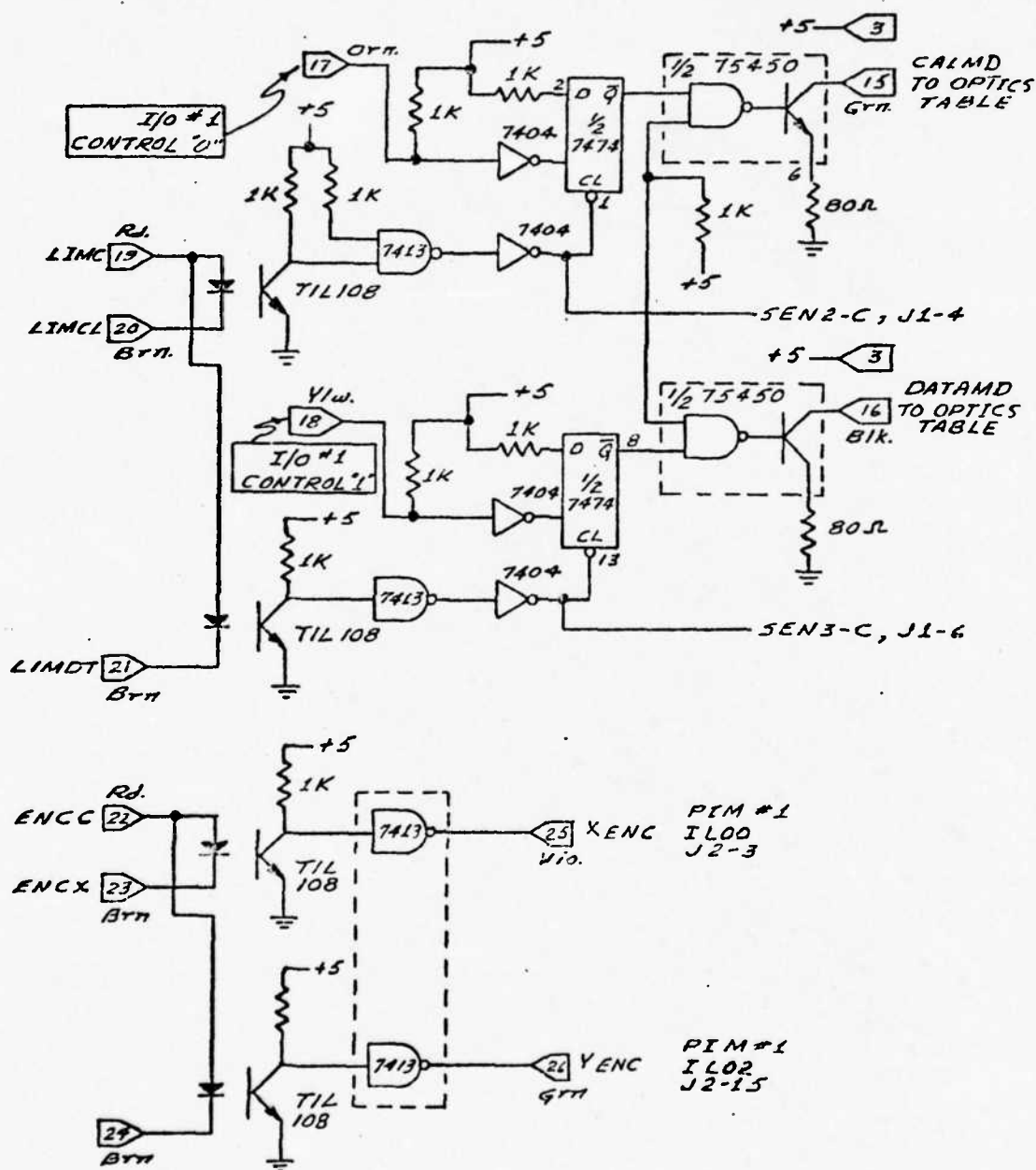
Plug-In Module, Slot #5 (Environmental Controls)



1 August 1973

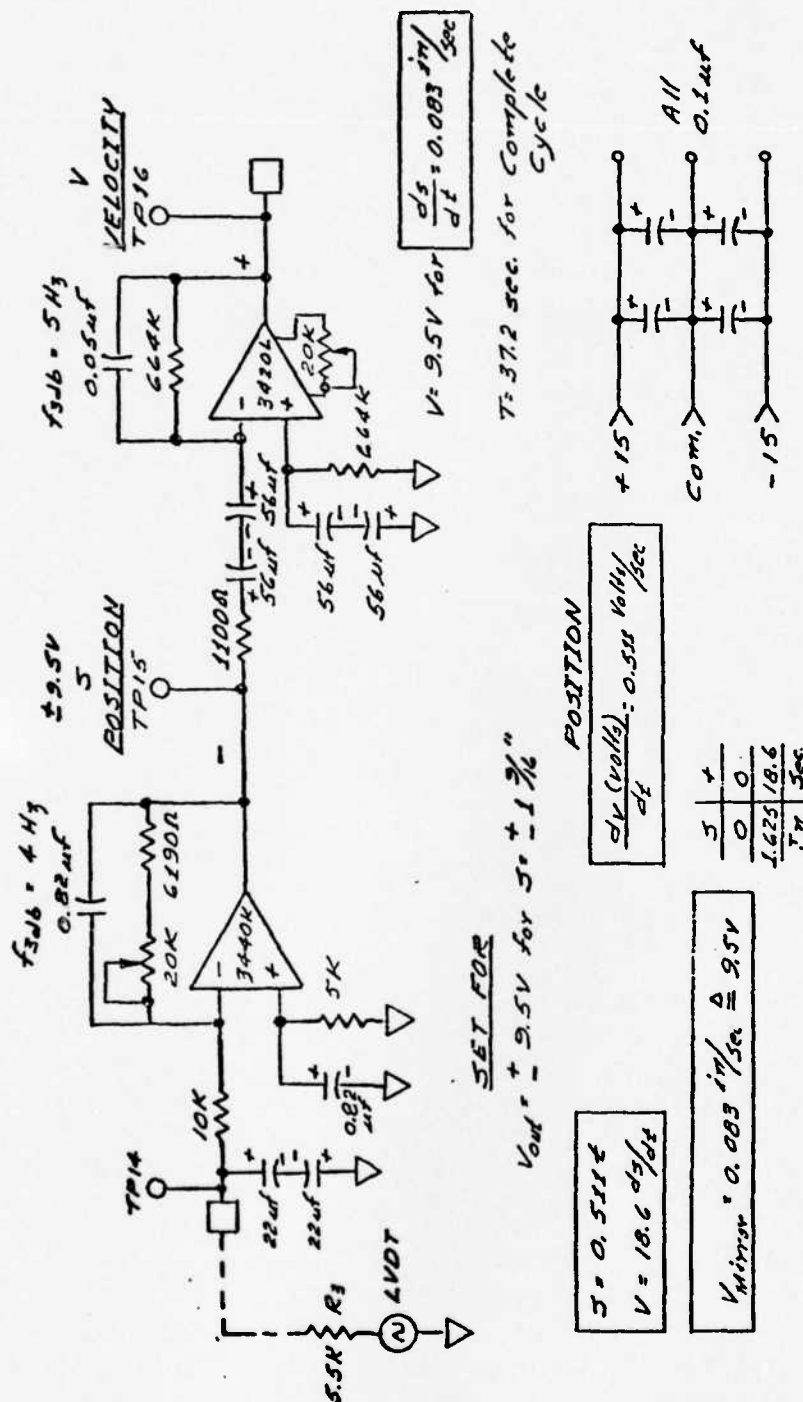


Plug-In Module, Slot #6 (Interferometer Doppler Mirror)

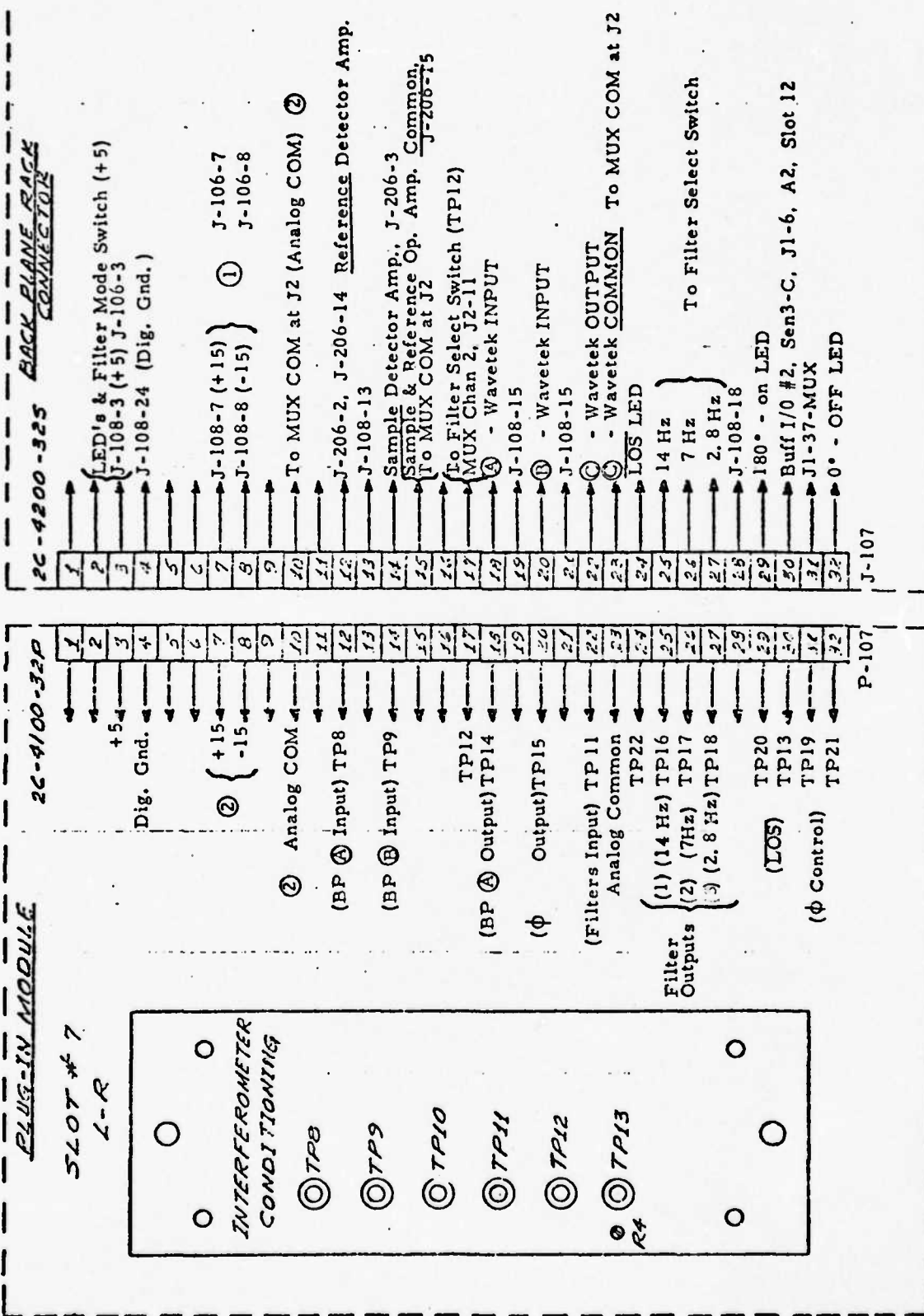


Vector Box, Slot #6 (Cal and Data Mode; X and Y Rack Encoders)

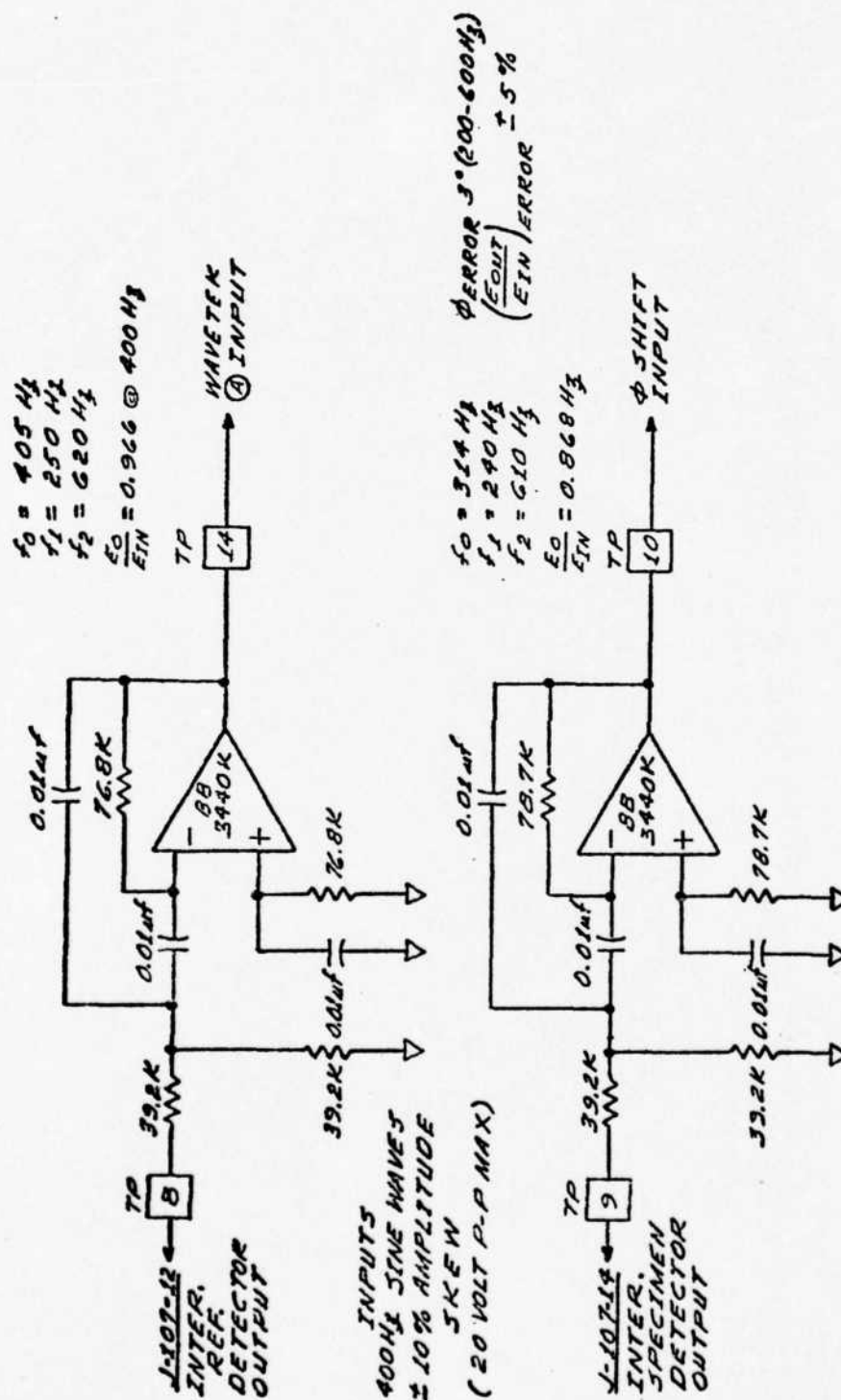
$$f_0 = 0.027 \text{ Hz}$$



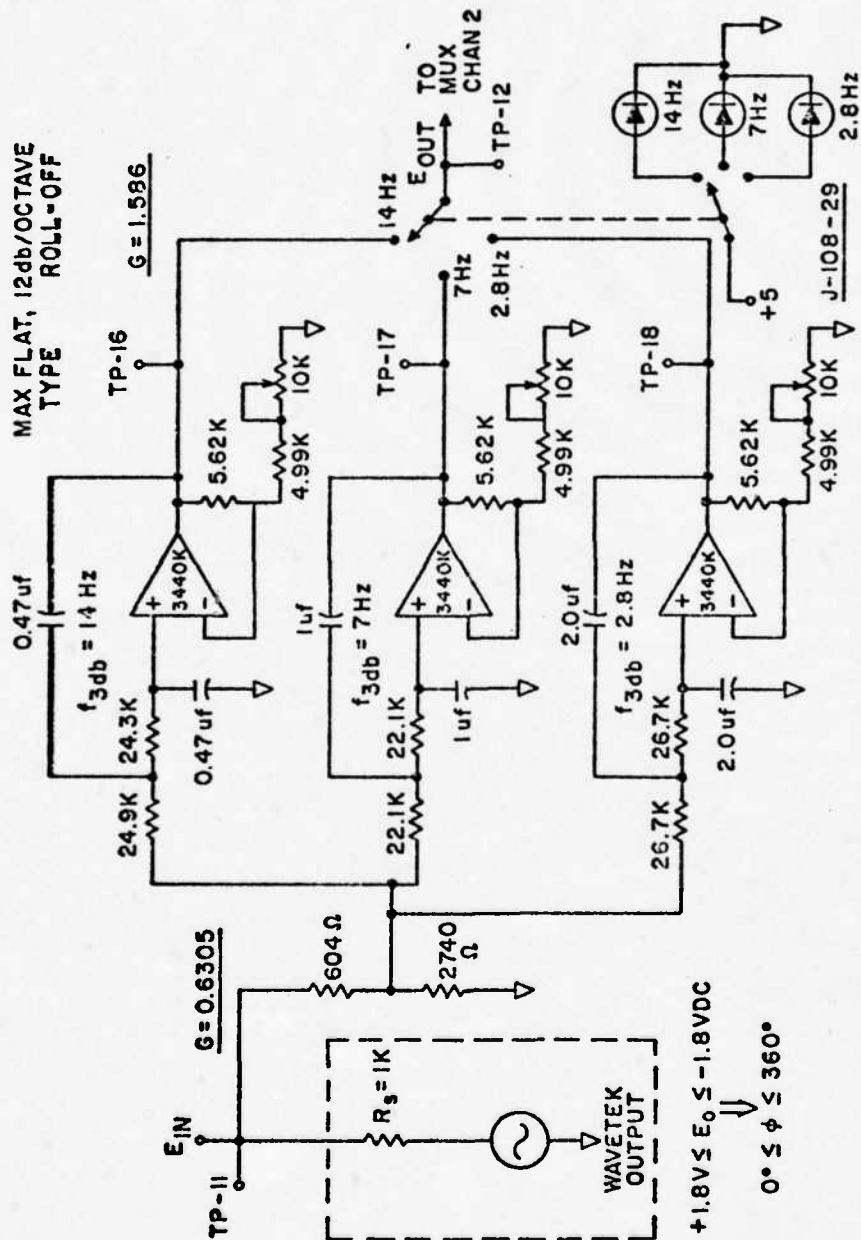
Doppler Mirror Position/Velocity Circuit



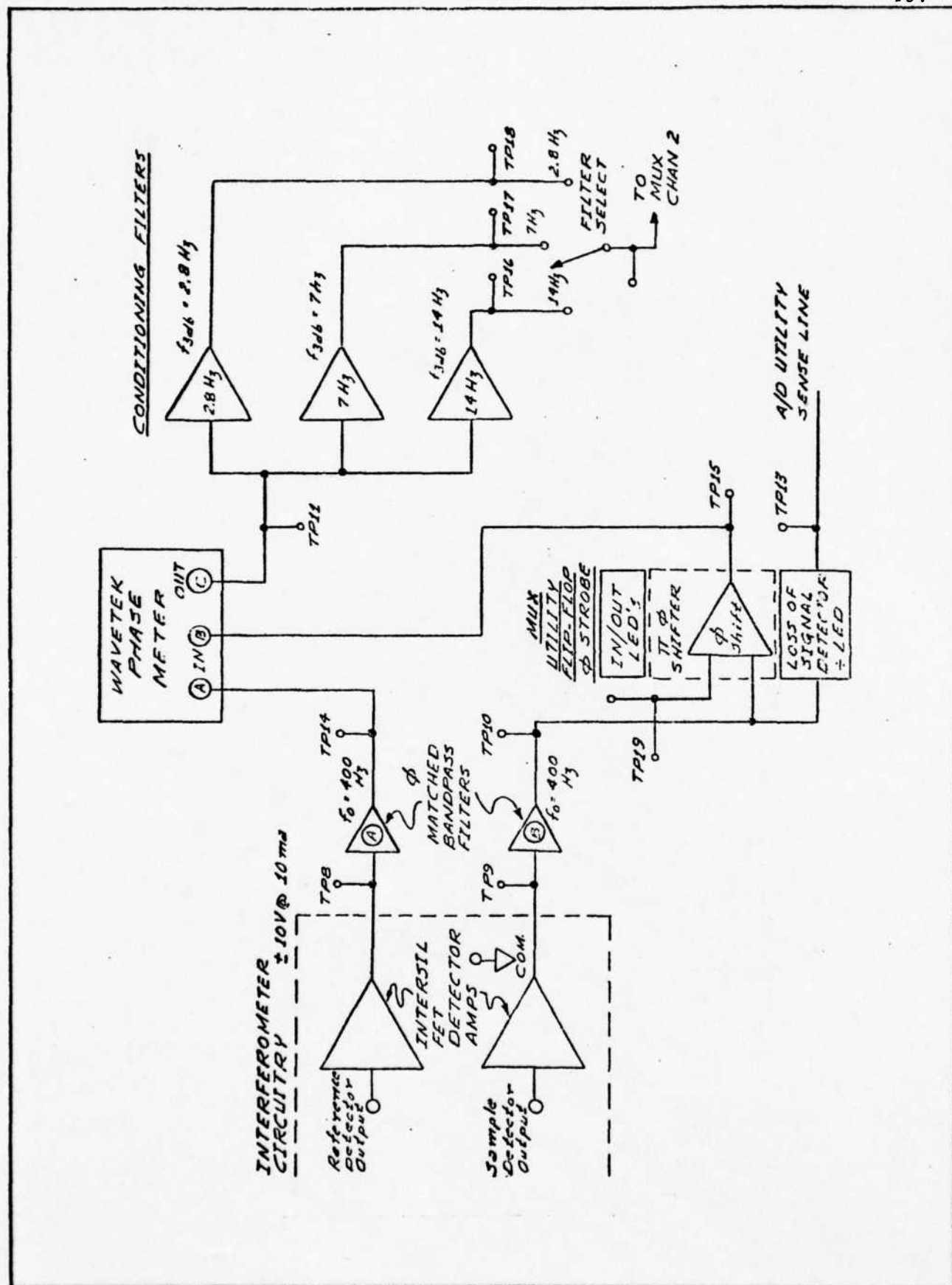
Plug-In Module, Slot #7 (Interferometer Signal Conditioning)



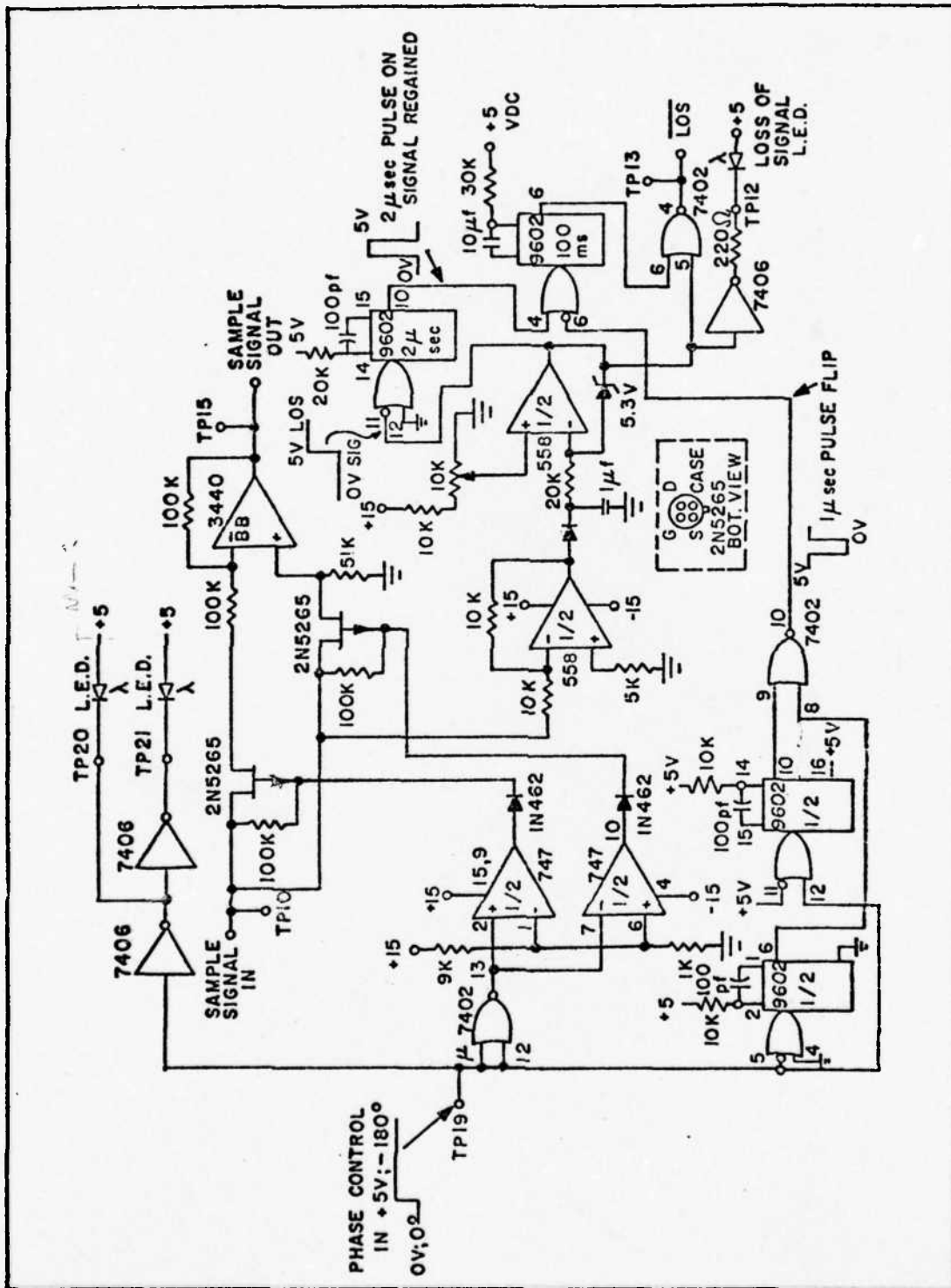
Phase-Matched Bank Pass Filters for Interferometer



Interferometer A/D Pre-Sample Filters



Interferometer Flow Diagram

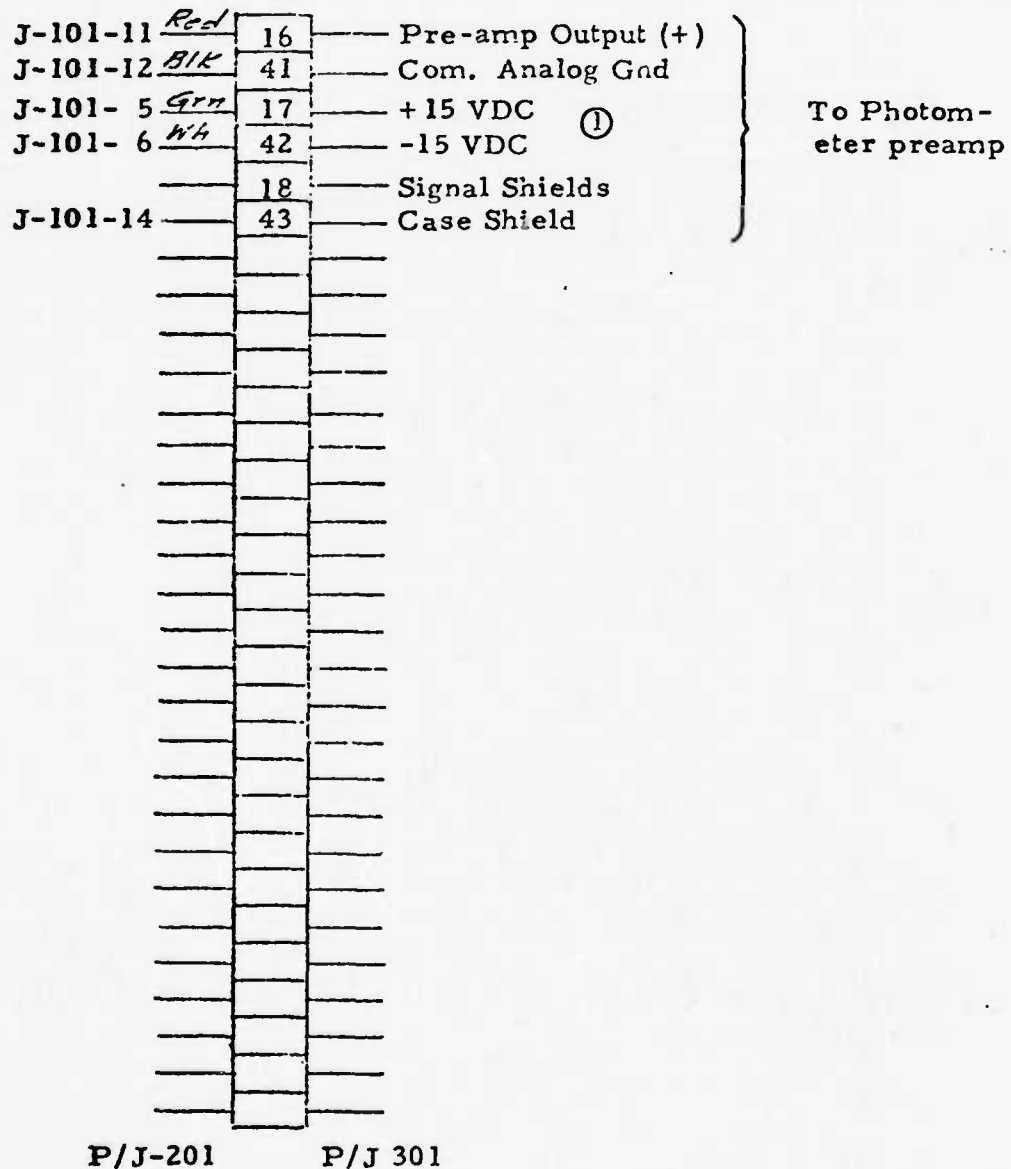


Interferometer Phase-Inverting Amplifier and Loss-of-Signal Detector

May 1975

2.2

CONNECTIONS BETWEEN REAR PANEL OF CONSOLE
AND CONNECTOR CHANNEL AT OPTICS TABLE (200
300 SERIES)



Console-to-Optics Table Connections (P/J 201, 301)

J-102-12	<u>Grn</u>	1	+5	} Q ₂ ¹ Q ₃ ¹ Q ₄ ¹ F _s ¹	Photometer Quad and Frame Sync pulses
J-102-13	<u>BLU</u>	26	R		
J-102-14	<u>Grn</u>	2	+5		
J-102-15	<u>Wh</u>	27	R		
J-102-16	<u>Red</u>	3	+5		
J-102-17	<u>Orn</u>	28	R		
J-102-21		4	+5		
J-102-22	<u>Ylw</u>	29	R		
J-104- 3	<u>Grn</u>	5	+5	}	
J-104-13	<u>Blk</u>	30	Beamdump		
J-104-14	<u>Blu</u>	6	DUMPC	} DUMP STATUS	BEAM DUMP
J-104-15	<u>Blk</u>	31	DUMPST		
J-104-17	<u>Wh</u>	7	Joyc (+5)	}	Joystick
J-104-18	<u>Blk</u>	32	Joy 1		
J-104-17	<u>Red</u>	8	Joyc (+5)		
J-104-19	<u>Grn</u>	33	Joy 2		
J-104-17	<u>Red</u>	9	Joyc (+5)		
J-104-20	<u>Blu</u>	34	Joy 3		
J-104-17	<u>Red</u>	10	Joyc (+5)		
J-104-22	<u>Wh</u>	35	Read Joy Stk		
J-104- 3	<u>Red</u>	11	+5		
J-104-23	<u>Blk</u>	36	Data Accepted, Joystk		
J-104- 3	<u>Brn</u>	12	+5	}	Cal & Data MODES
J-104-15	<u>Red</u>	37	CALMD		
J-104- 3	<u>Orn</u>	13	+5		
J-104-16	<u>Blk</u>	38	DATAMD		
J-104-19	<u>Brn</u>	14	LIMC (+5)		
J-104-20	<u>Blk</u>	39	LIMCL		
J-104-19	<u>Ylw</u>	15	LIMC (+5)		
J-104-21	<u>Blk</u>	40	LIMDT		

P/J-202

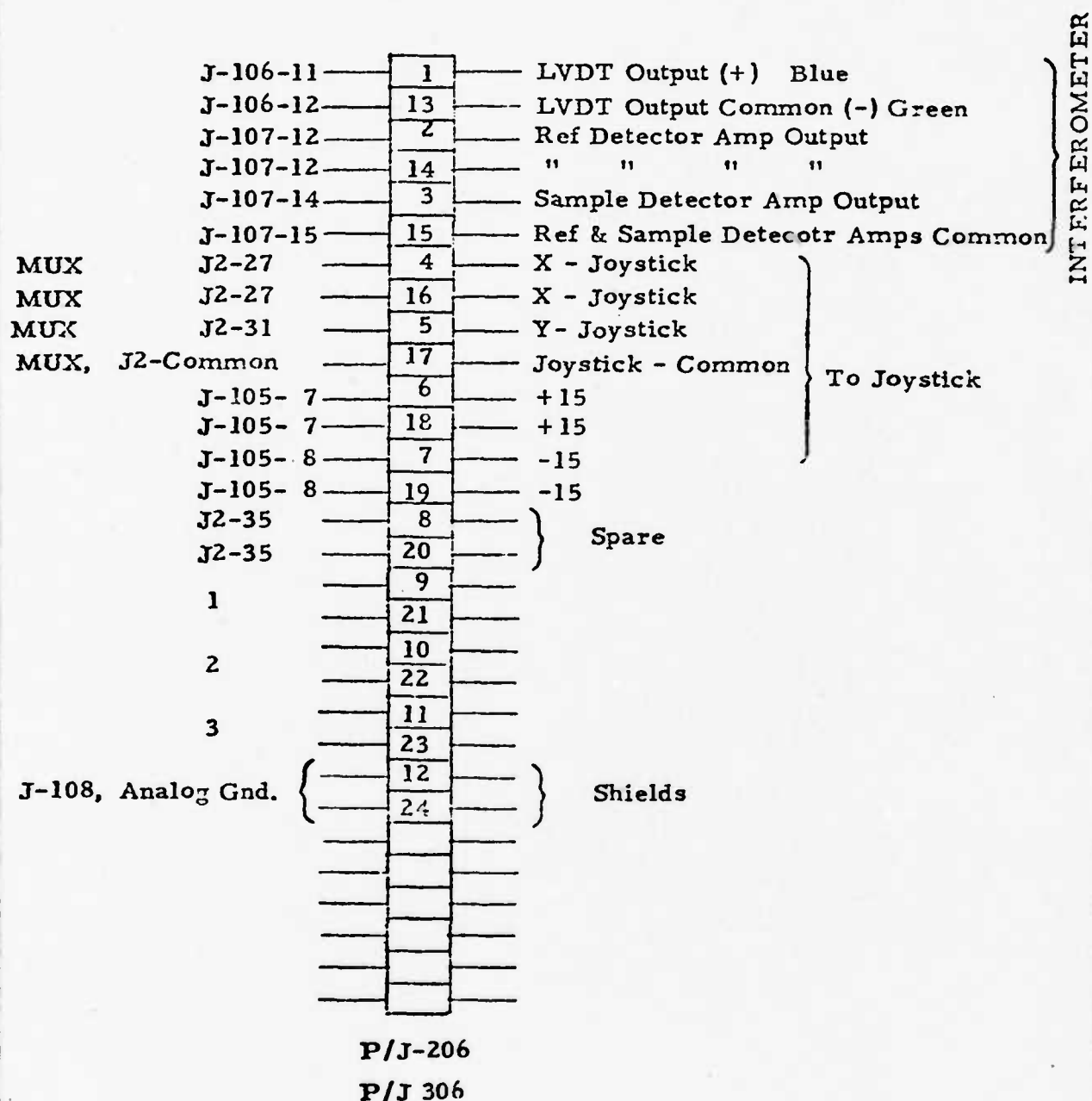
P/J-302

J-106-22	1	ENCC	} Cal & Data MODES
J-106-23	26	ENCX	
J-106-22	2	ENCC	
J-106-24	27	ENCY	
J-105-22	3	LNLC	} Environmental Warnings
J-105-23	28	LNL	
J-105-24	4	CWFC	
J-105-25	29	CWF	
J-105-26	5	RTWC	
J-105-27	30	RTW	
J-105-28	6	TOLC	
J-105-29	31	TOL	} Spares Vector Box Slot #5
J-105-11	7		
J-105-12	32		
J-105-13	8		
J-105-14	33		
J-105-21	9		
J-105-30	34		
J-105-31	10		} Spare, Vector Box Slot #5
J-105-32	35		
J-104- 7	11		
J-104- 8	36		} Spares Vector Box Slot #5
J-106-29	12		
J-106-30	37		
J-106-31	13		} Spares Vector Box Slot #5
J-106-32	38		
J-105- 1	14		
J-105- 2	39		
J-105- 5	15		
J-105- 6	40		

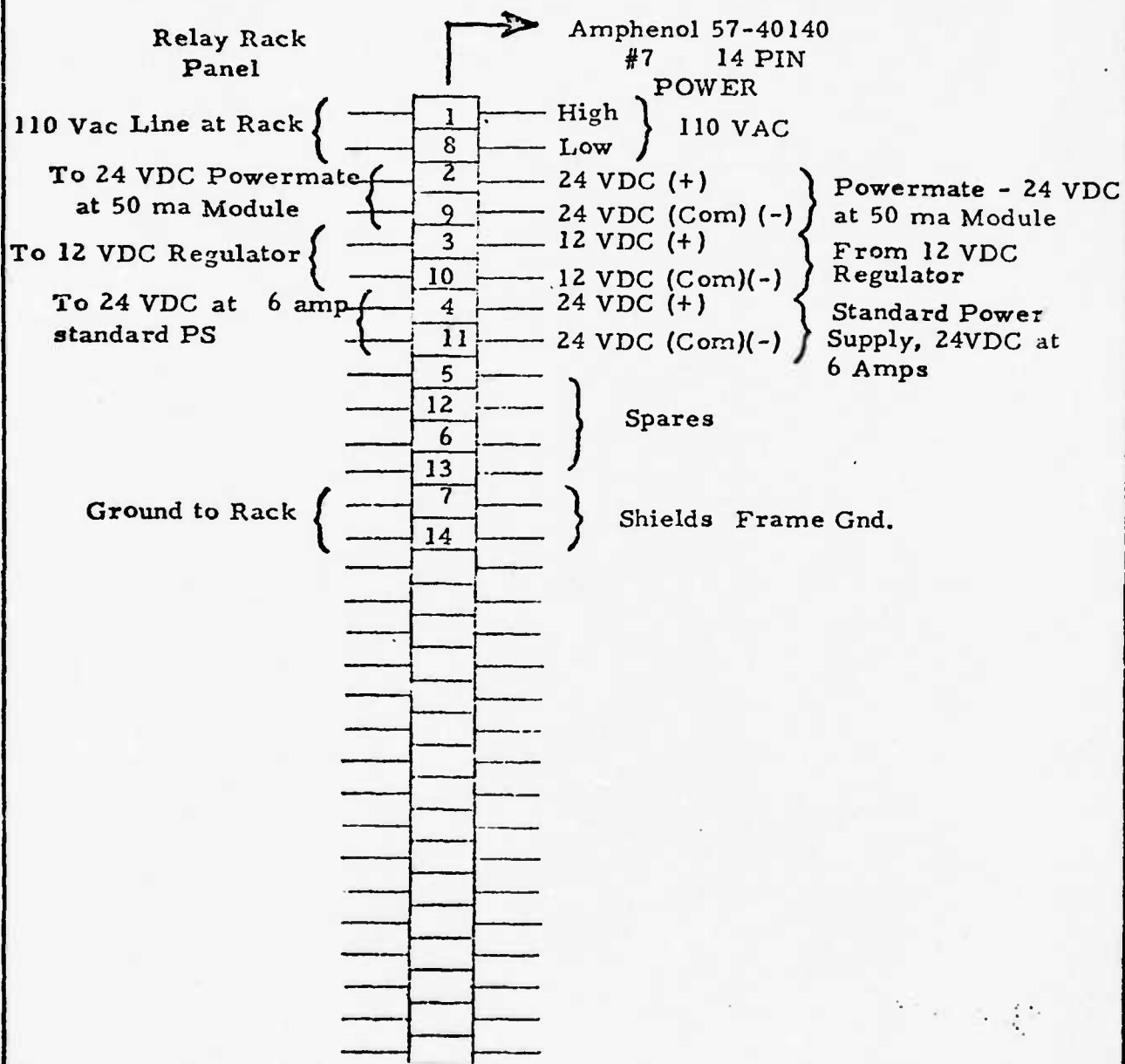
P/J-203
P/J 303

FROM ELECTRONICS RACK +5 SUPPLY	+5VDC	1	26	DATA 1
	+5VDC	2	27	DATA 2
	+5VDC	3	28	DATA 3
	+5VDC	4	29	DATA 4
	+5VDC	5	30	DATA 5
	+5VDC	6	31	DATA 6
	+5VDC	7	32	DATA 7
	+5VDC	8	33	DATA 8
	+5VDC	9	34	STROBE
	+5VDC	10	35	ON LINE
	+5VDC	11	36	ENABLE
	+5VDC	12	37	SPARE SENDER
	+5VDC	13	38	SPARE SENDER
	+5VDC	14	39	READY FOR CHAR. 1
	+5VDC	15	40	IN POSITION 1
	+5VDC	16	41	BUSY
	+5VDC	17	42	REF "0" 1
FROM N.C. +5V SUPPLY		18	43	
		19	44	
		20	45	
		21	46	
		22	47	
		23	48	
		24	49	
		25	50	

P/J 205
P/J 405



Console-to-Optics Table Connections (P/J 206, 306)

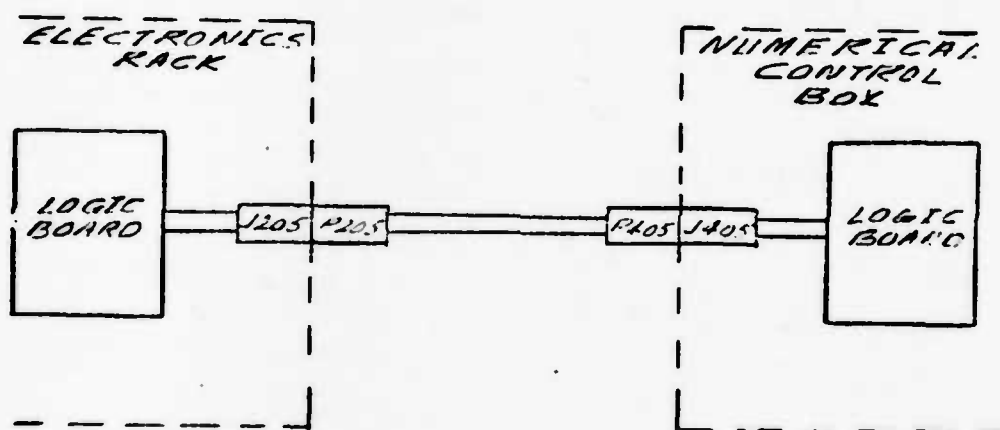


P/J-207

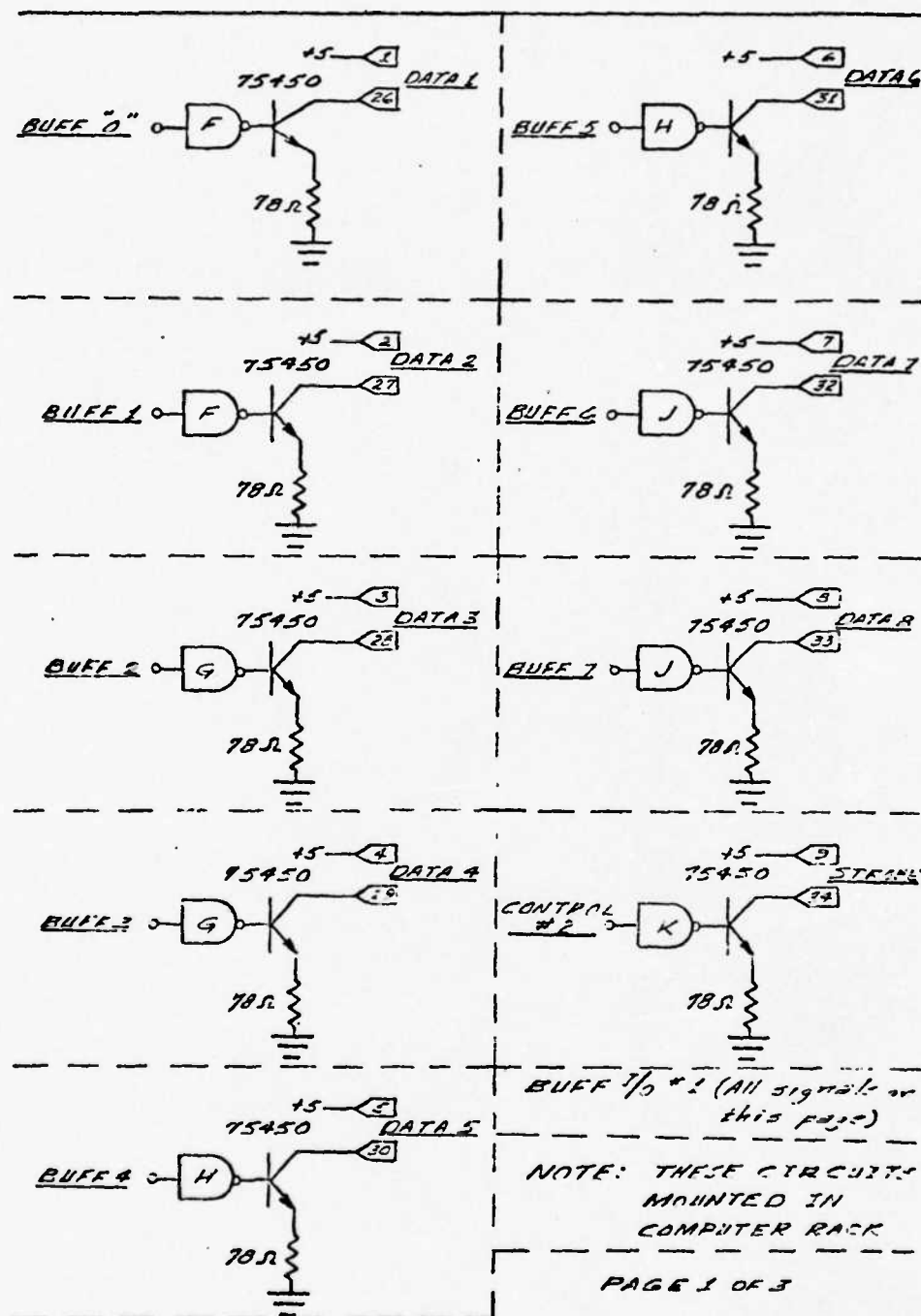
P/J 307

2.3

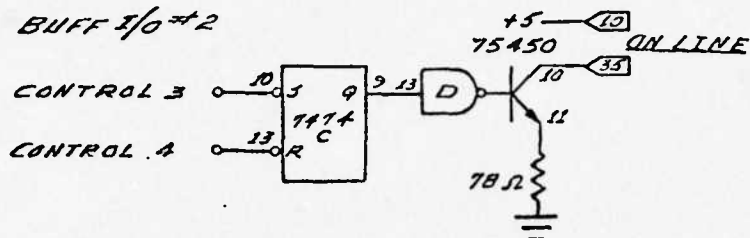
NUMERICAL CONTROLLER (400 SERIES)



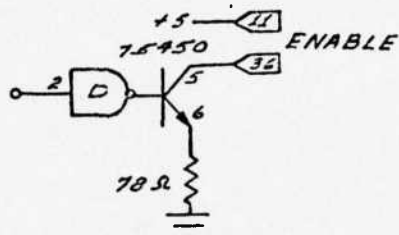
Numerical Control Wiring Block Diagram



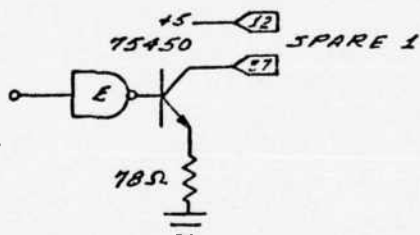
BUFF I/O #2



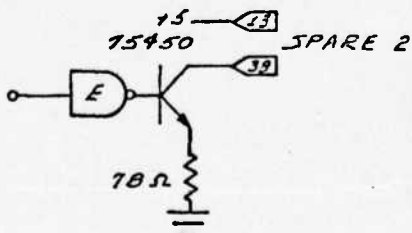
(OPEN)



(OPEN)

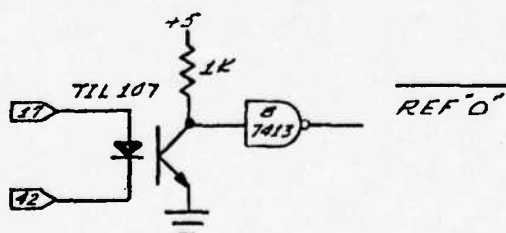
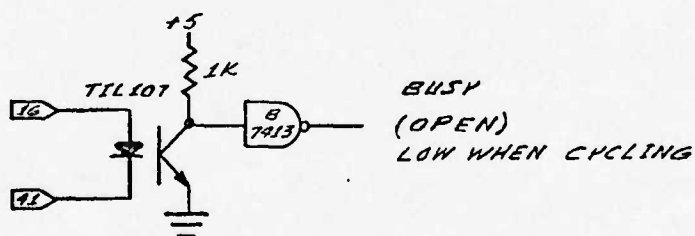
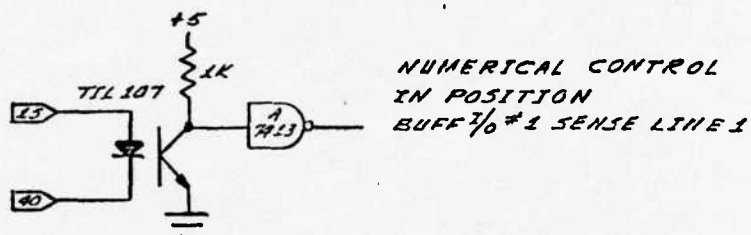
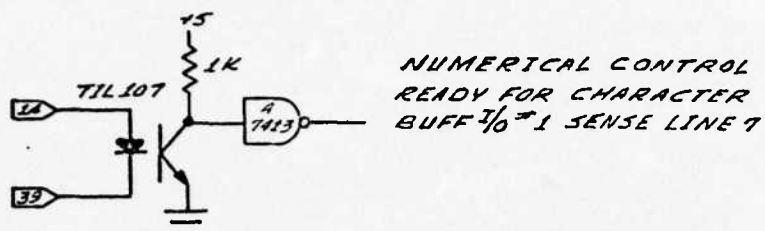


(OPEN)



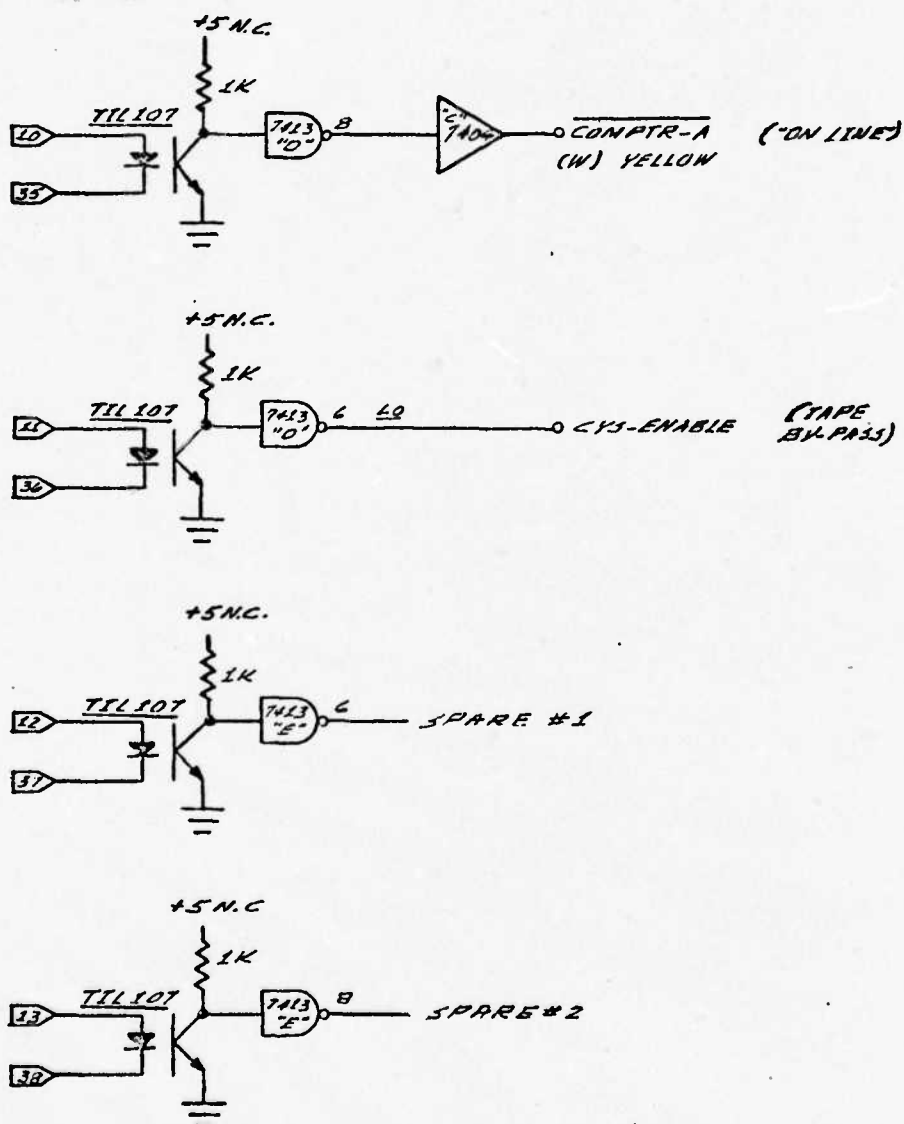
MOUNTED IN RACK

PAGE 2 OF 3



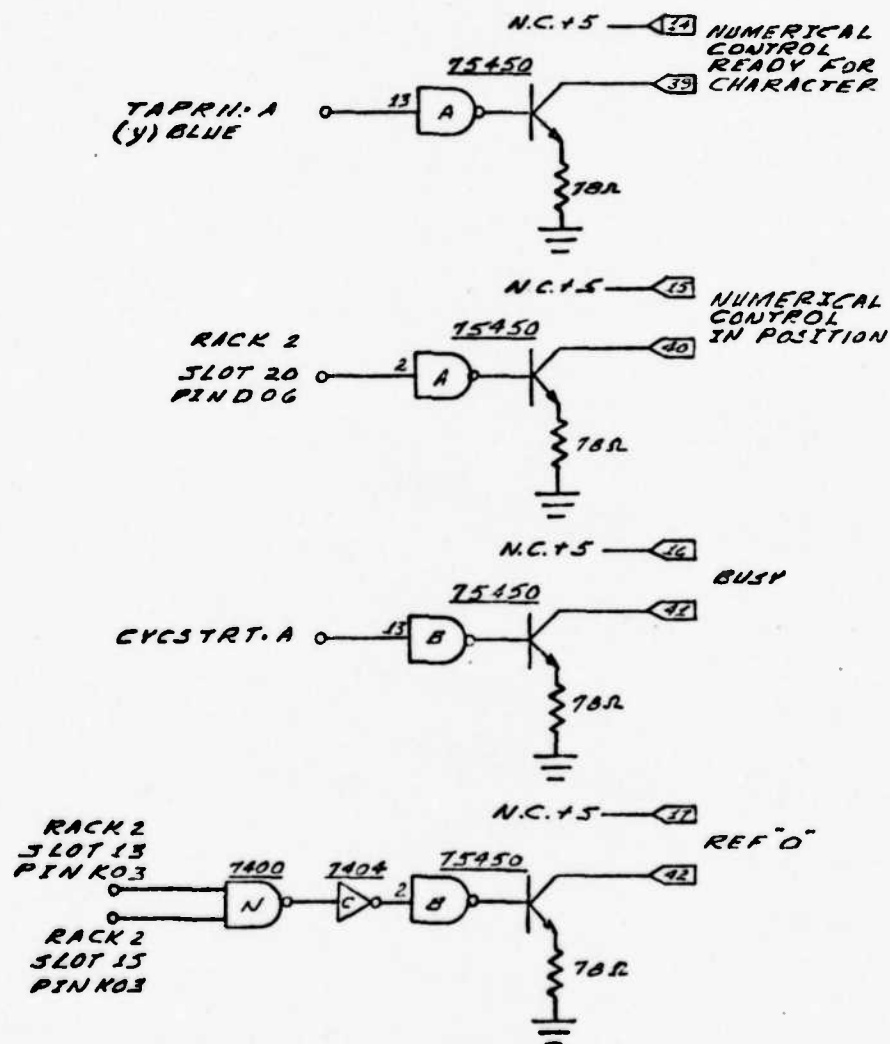
MOUNTED IN RACK
PAGE 3 OF 3

Logic Board in N.C. Box 1 of 3



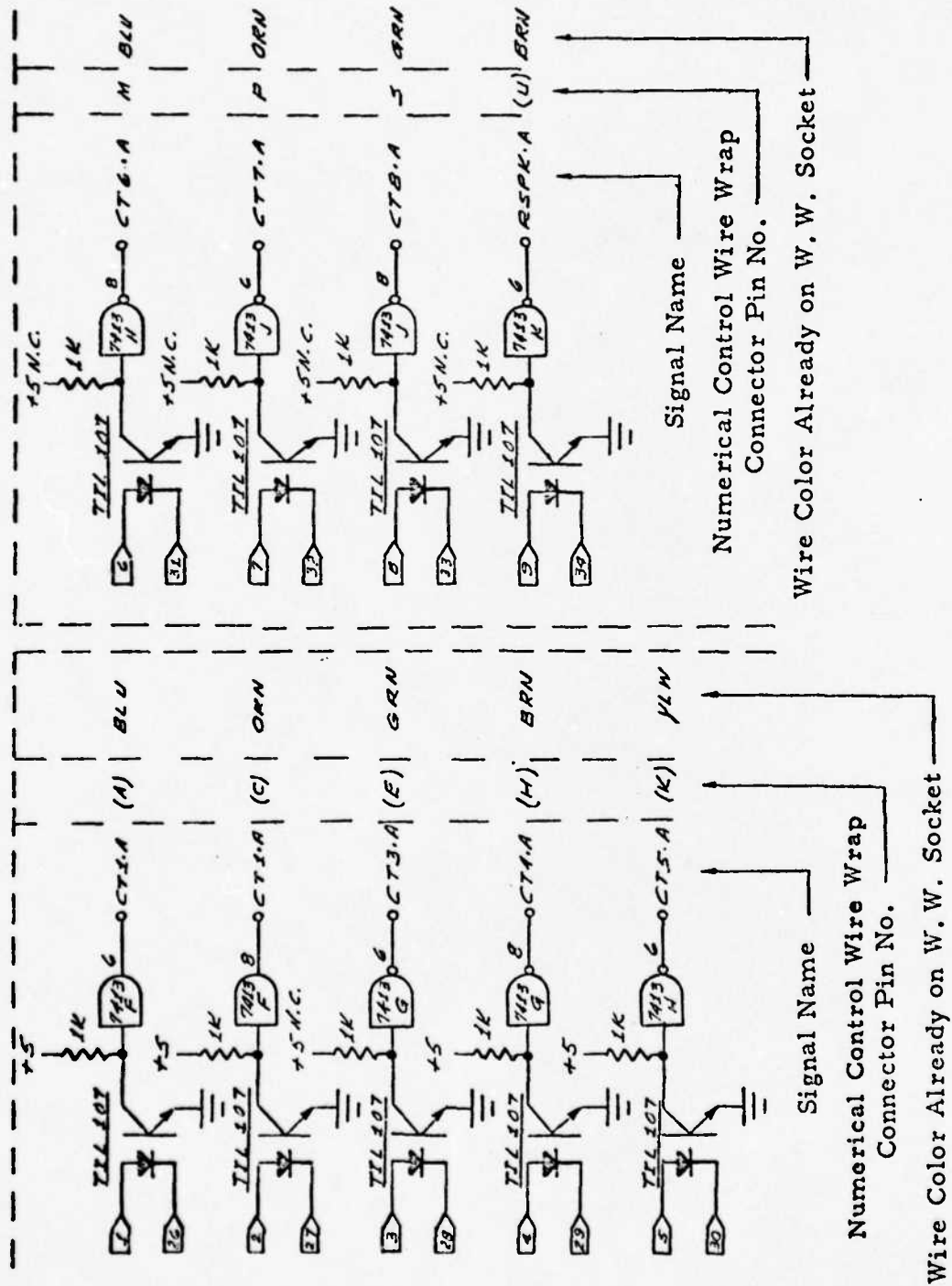
NOTE: These circuits are mounted inside the G. E. numerical control box. The 5-volt connections are the G. E. power supply. (X) indicates wire wrap connector of numerical controller.

Logic Board in N.C. Box 2 of 3



Numerical Control Status Responses

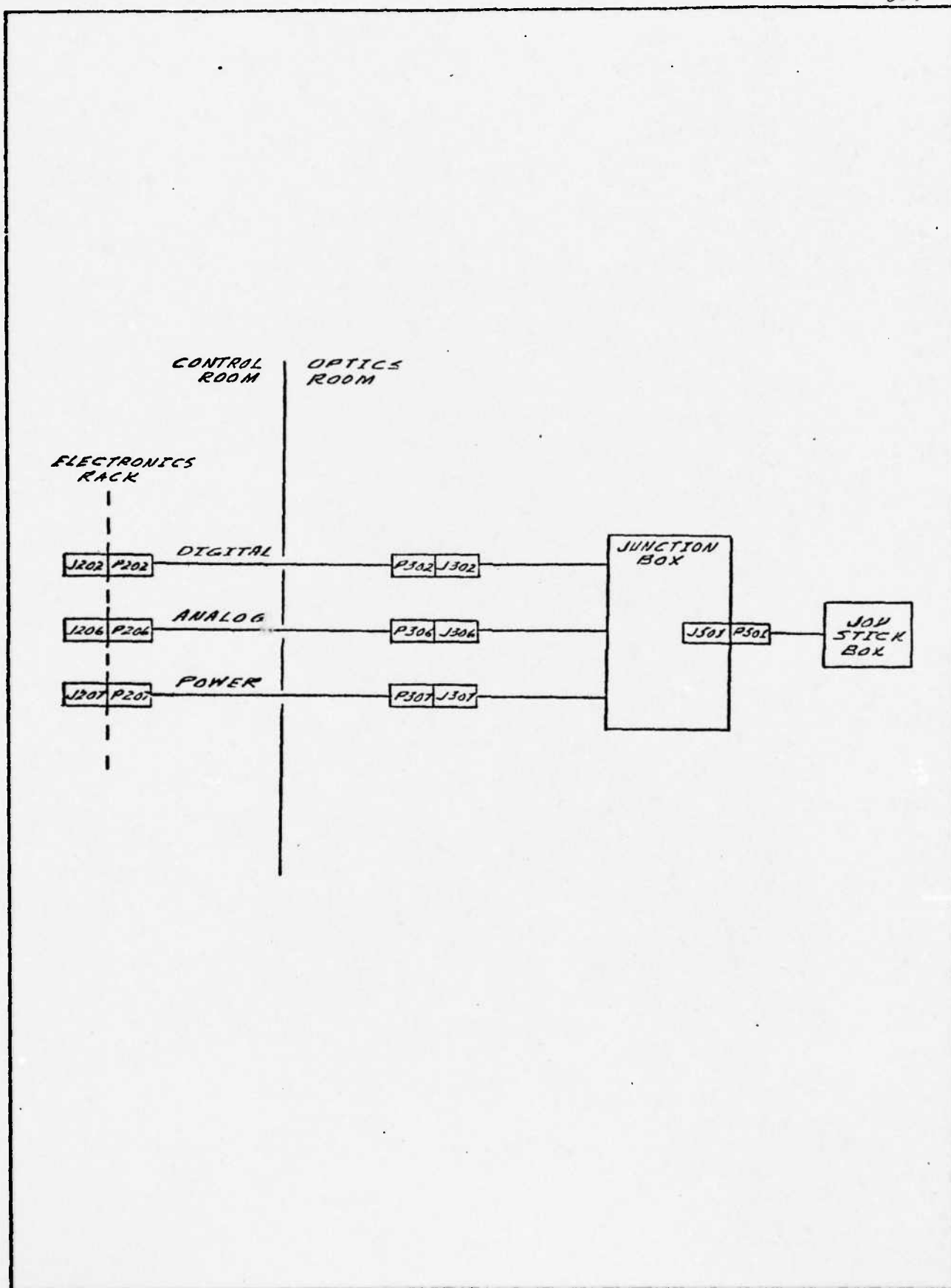
Logic Board in M.C. Box 3 of 3



Numerical Control Data Transfer

2.4

JOYSTICK (500 SERIES)

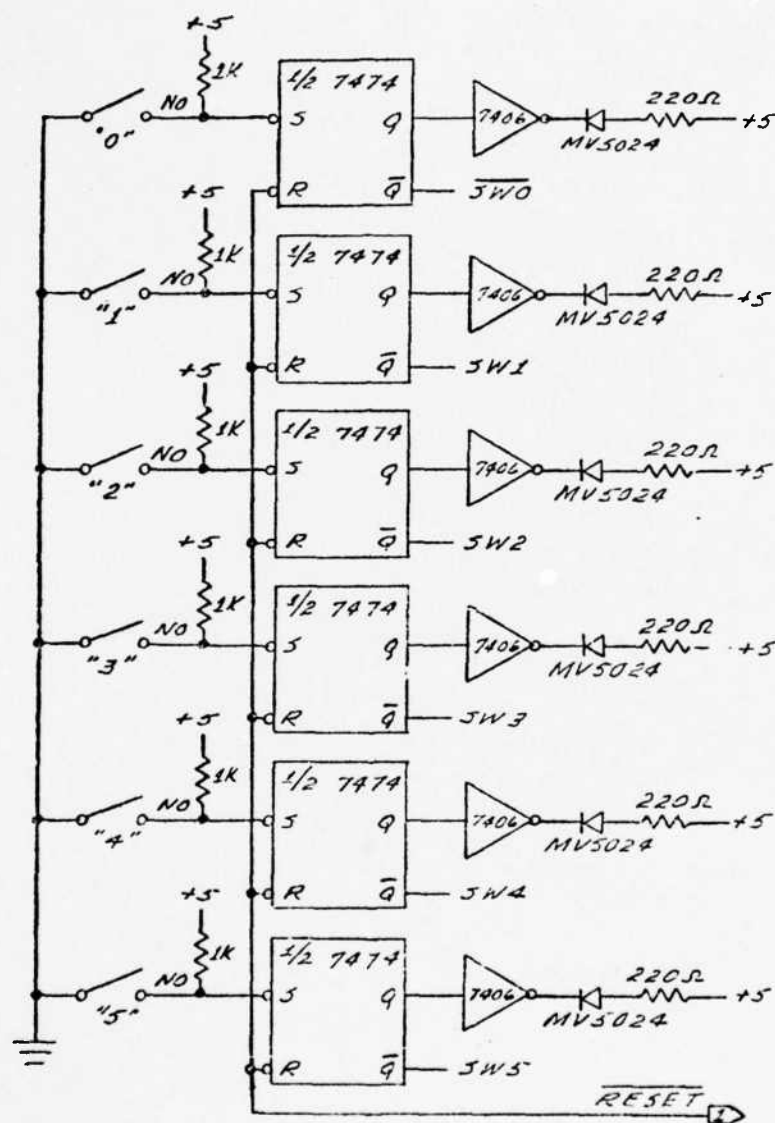


Joystick Wiring Block Diagram

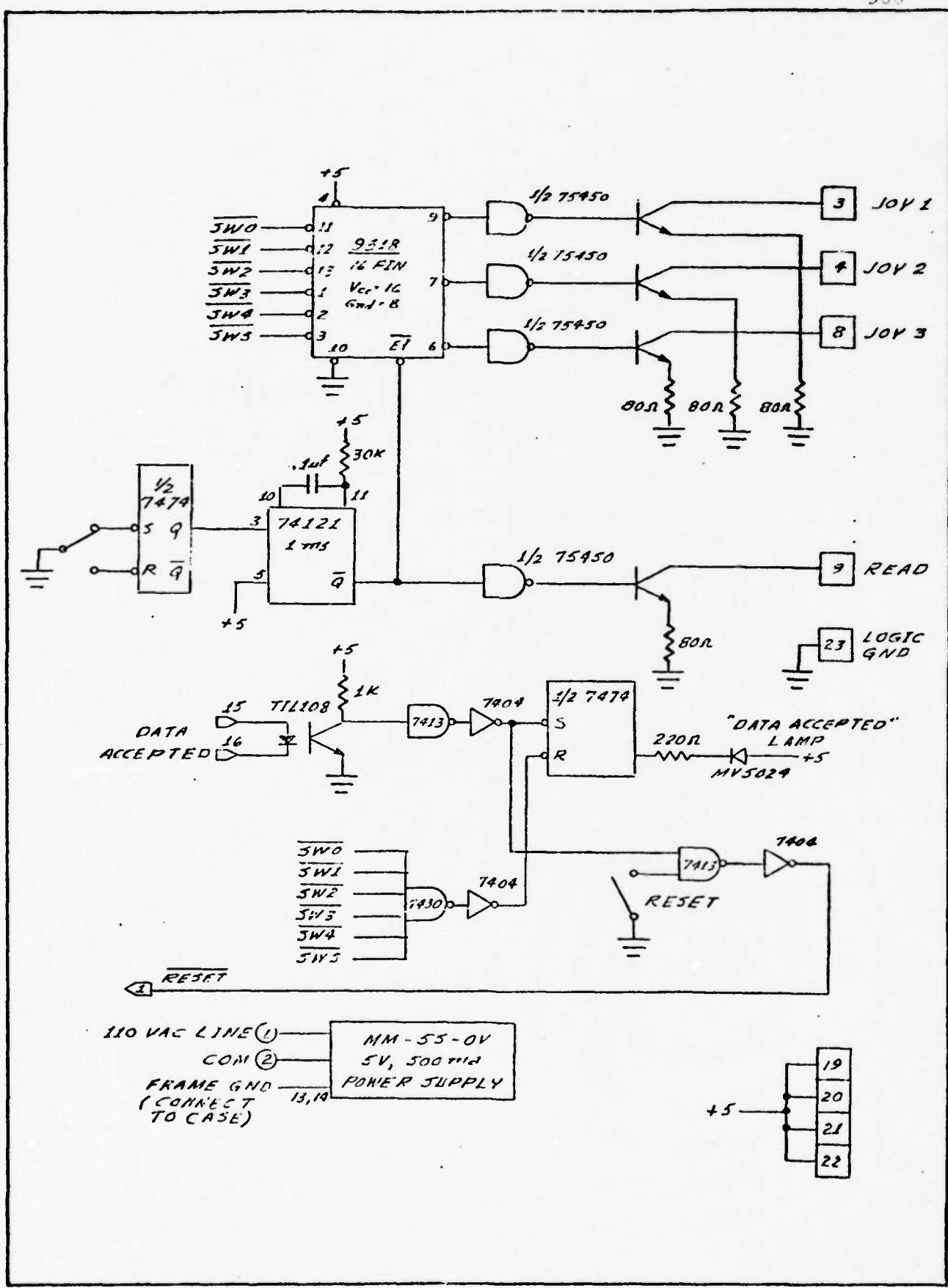
110 VAC	1	13	FRAME GND
110 VAC COM	2	14	FRAME GND
JOY 1	3	15	DATA ACCEPTED
JOY 2	4	16	DATA ACCEPTED RST
	5	17	
"X" (POSITION VOLTAGE)	6	18	
"Y" (POSITION VOLTAGE)	7	19	+5VDC (JOY 1)
JOY 3	8	20	+5VDC (JOY 2)
"READ"	9	21	+5VDC (JOY 3)
+15 VDC	10	22	+5VDC ("READ")
-15 VDC	11	23	
SHIELDS	12	24	ANALOG COM

P/J 501

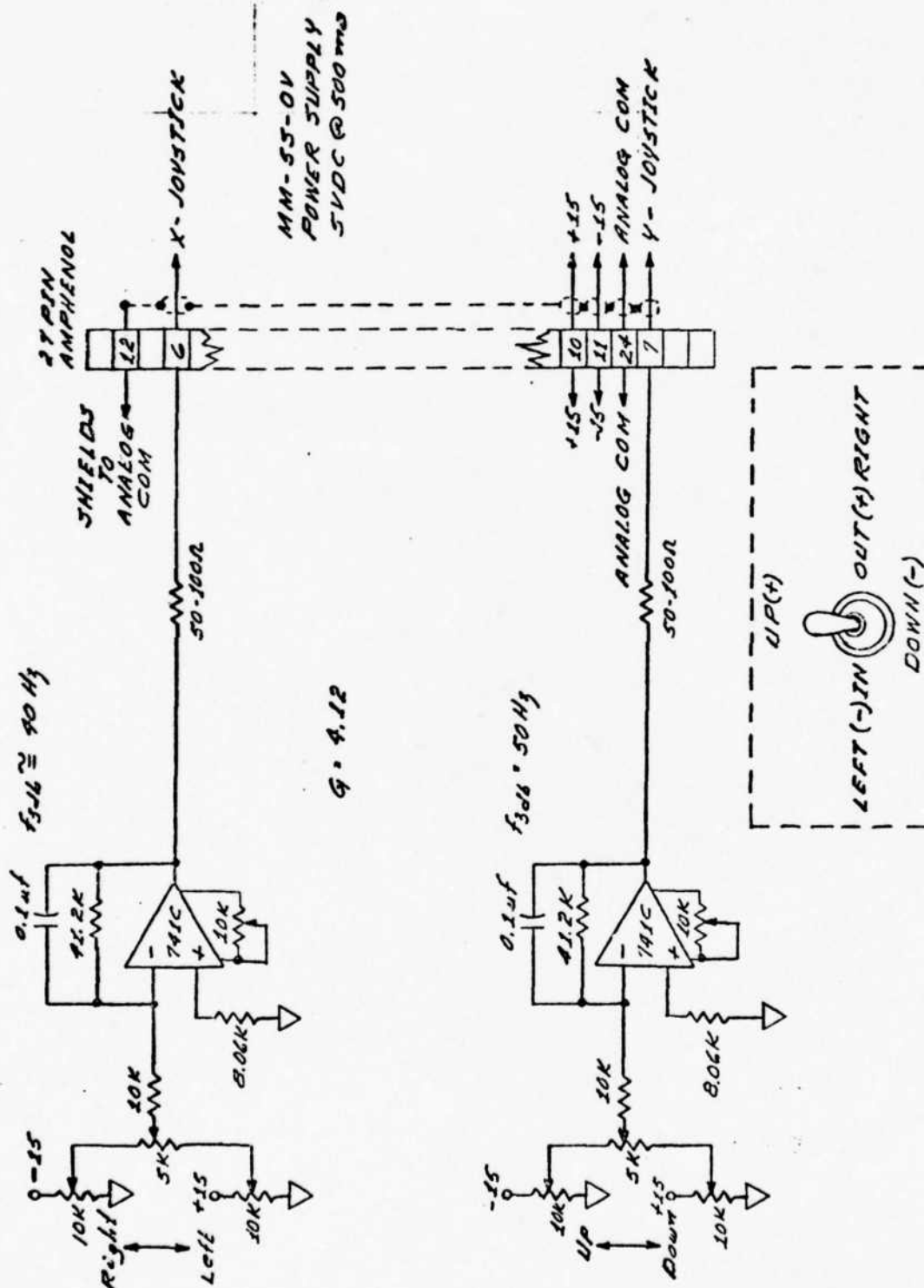
Connector at Joystick Cable Junction Box



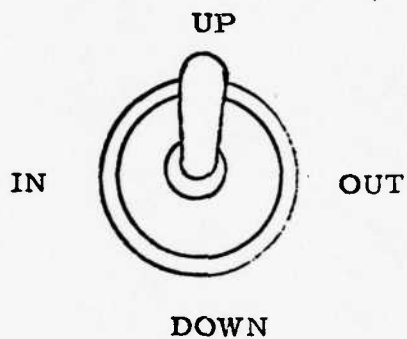
Joystick Digital Portion (Inside Joystick Box) Sheet 1 of 2



Joystick Digital Portion (Inside Joystick Box) Sheet 2 of 2



Joystick Control

JOYSTICK LEGEND

In/Out of table slot

FULL SCALE OUTPUTS

UP +9.5 V

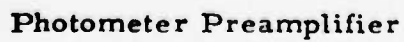
In -9.5 V

DOWN -9.5 V

Out +9.5 V

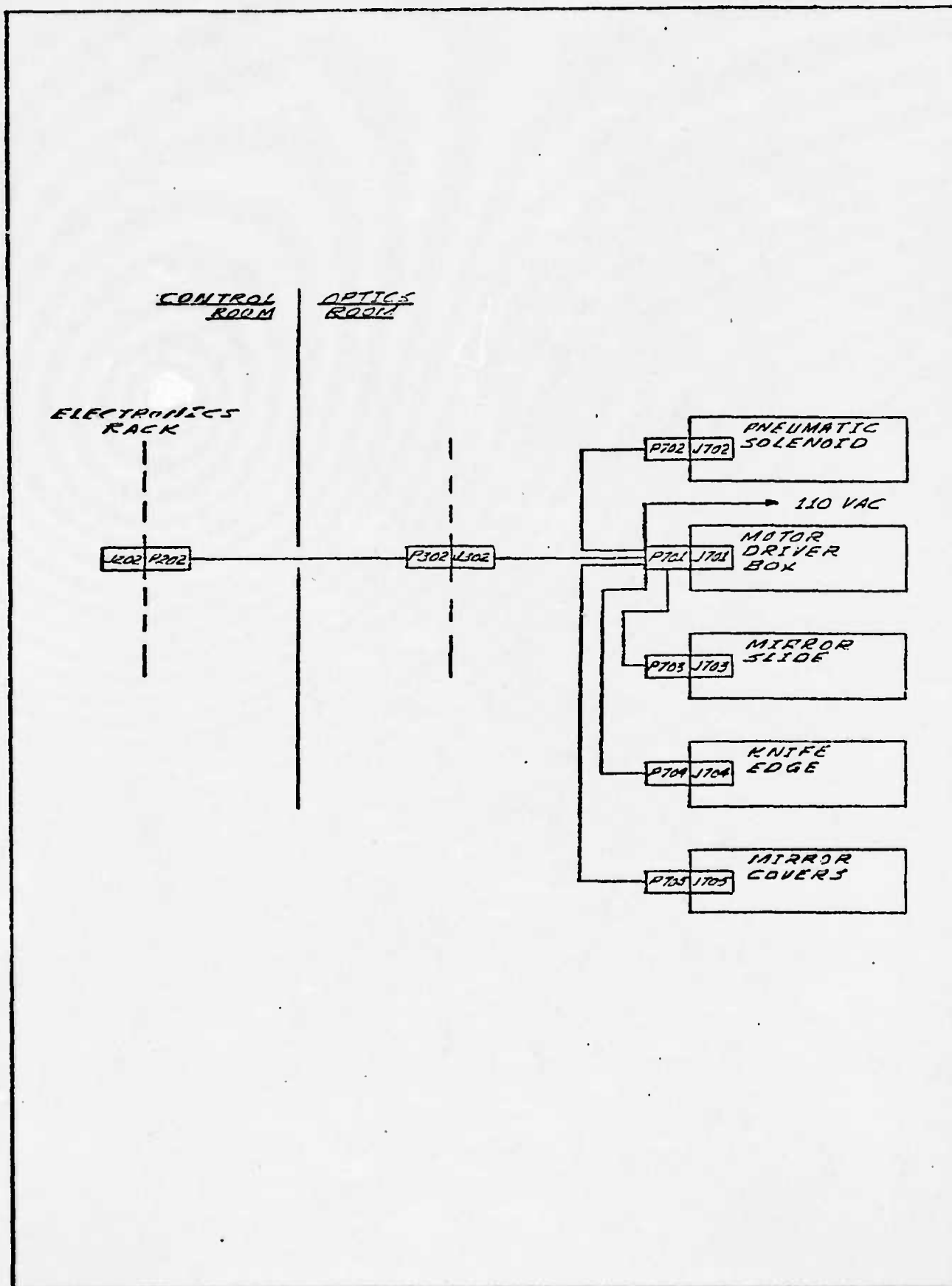
2.5

PHOTOMETER PREAMPLIFIER (600 SERIES)

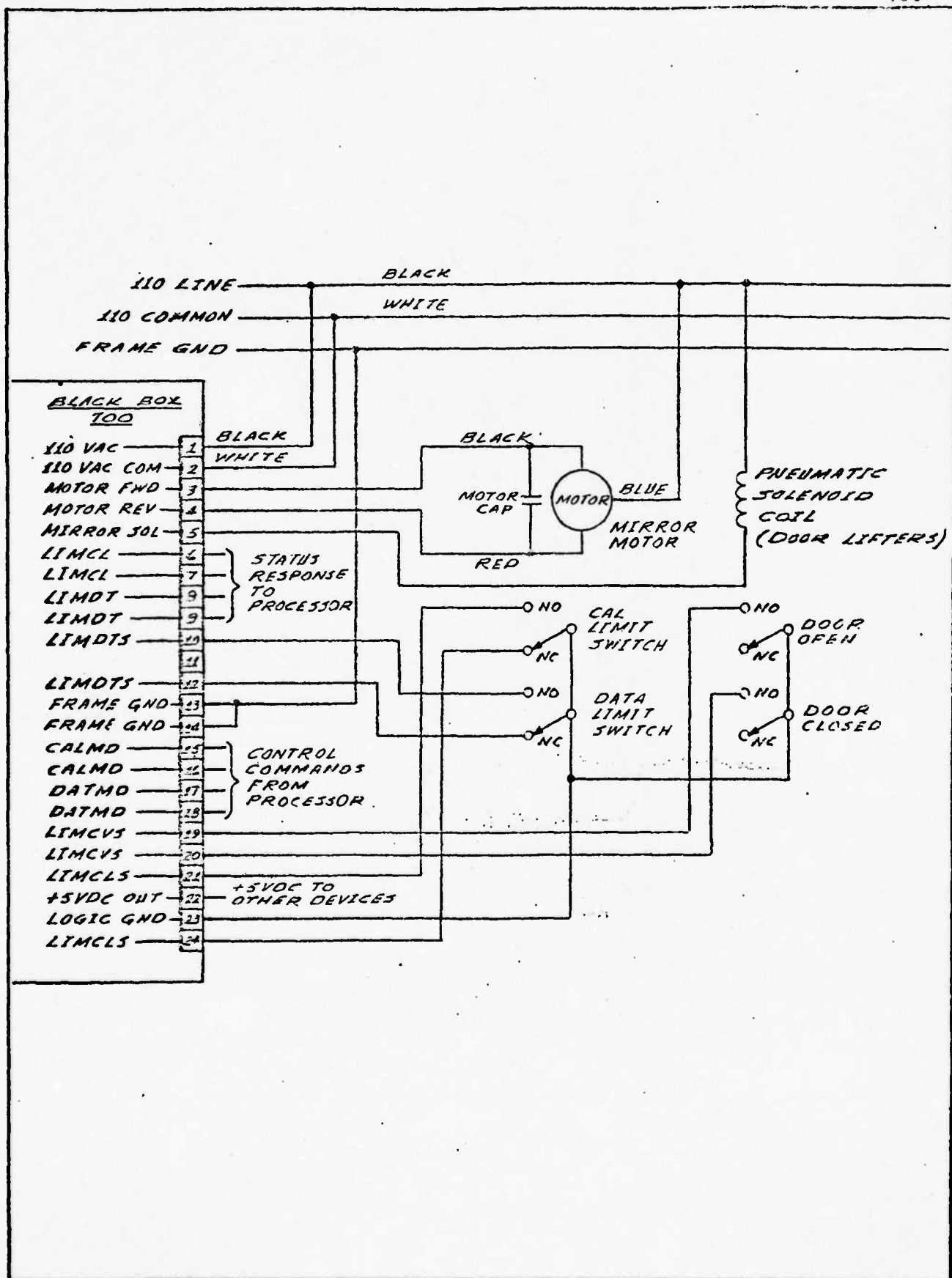


2.6

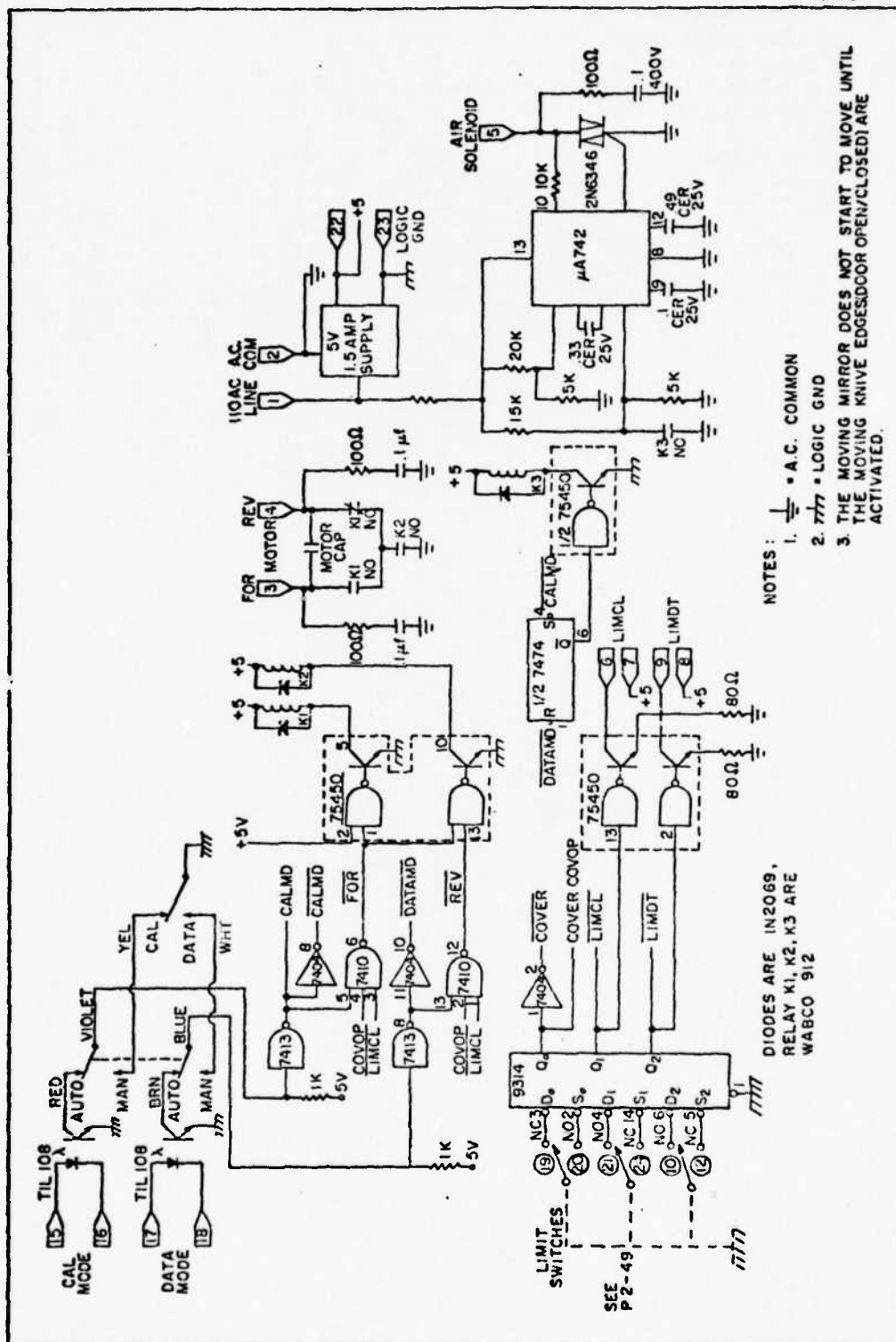
PHOTOMETER CALIBRATION MIRROR CIRCUITRY (700 SERIES)



Calibration Mirrors Wiring Block Diagram



Photometer Calibration Mirror System Wiring



Mirror and Door Driver Circuit (Optics Room)

May 1975

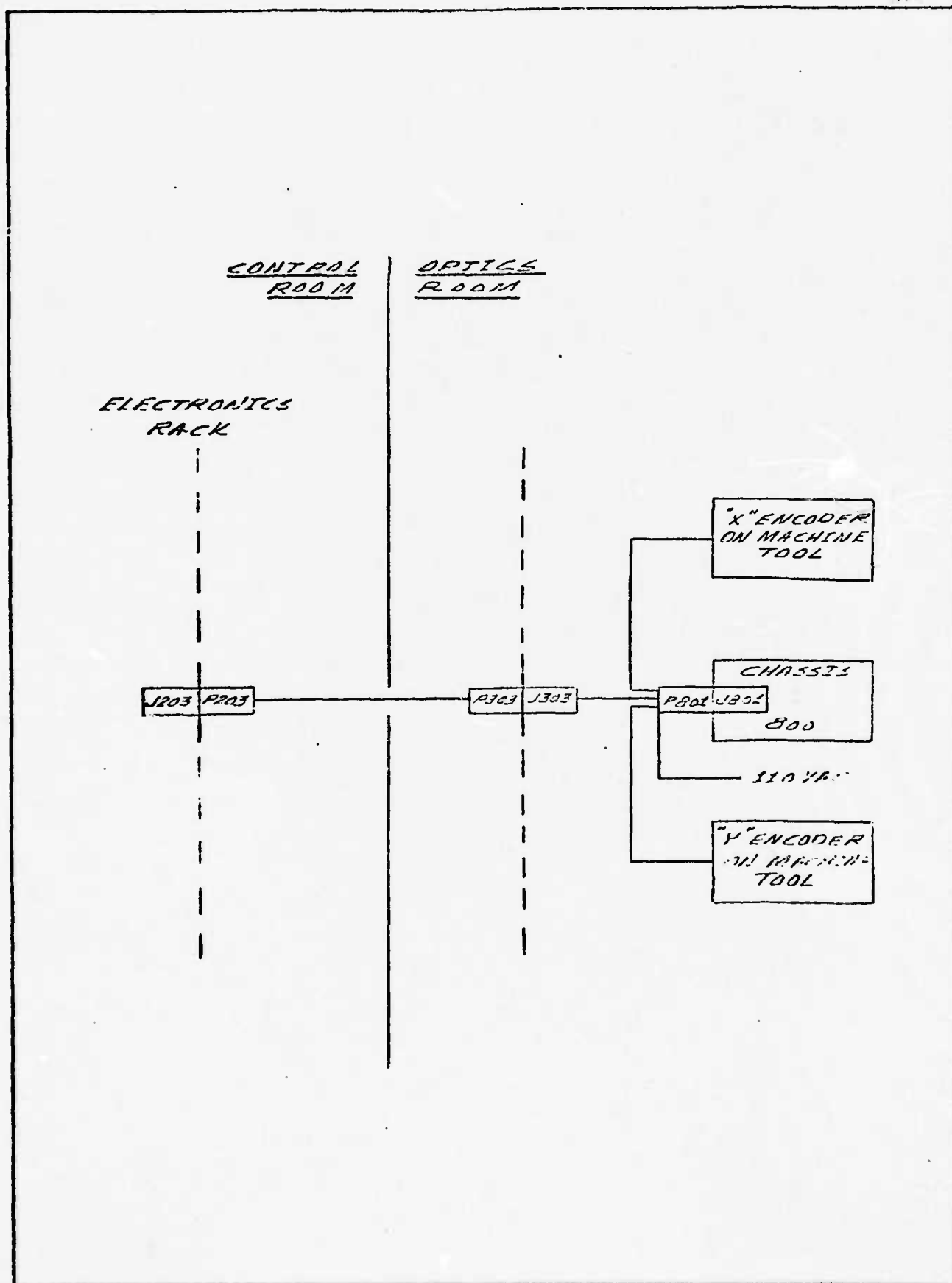
<u>110 VAC LINE</u> <u>P702-A</u>	<u>1</u>	<u>13</u>	<u>FRAME GND</u> <u>P703-13</u>
<u>110 VAC COM</u> <u>P703-2</u>	<u>2</u>	<u>14</u>	<u>P705-19</u> <u>P704-A</u>
<u>MOTOR FWD</u> <u>P703-3</u>	<u>3</u>	<u>15</u>	<u>CALMD (+5)</u> <u>J302-12</u>
<u>MOTOR REV</u> <u>P703-4</u>	<u>4</u>	<u>16</u>	<u>CALMD</u> <u>J302-37</u>
<u>MIRROR SOL</u> <u>P712-B</u>	<u>5</u>	<u>17</u>	<u>DATAMD (+5)</u> <u>J302-13</u>
<u>LIMCL</u> <u>J302-39</u>	<u>6</u>	<u>18</u>	<u>DATAMD</u> <u>J302-38</u>
<u>LIMCL (+5)</u> <u>J302-14</u>	<u>7</u>	<u>19</u>	<u>LIMCVS</u> <u>P704-B</u>
<u>LIMDT (+5)</u> <u>J302-15</u>	<u>8</u>	<u>20</u>	<u>LIMCVS</u> <u>P704-D</u>
<u>LIMDT</u> <u>J302-70</u>	<u>9</u>	<u>21</u>	<u>LIMCLS</u> <u>P704-21</u>
<u>LIMDT</u> <u>P703-10</u>	<u>10</u>	<u>22</u>	
<u>P715-20, P704-E</u>	<u>11</u>	<u>23</u>	<u>LOGIC GND</u> <u>P703-13</u> <u>P705-23</u>
<u>LIMDT5</u> <u>P703-12</u>	<u>12</u>	<u>24</u>	<u>LIMCLS</u> <u>P703-24</u>

P/J 701

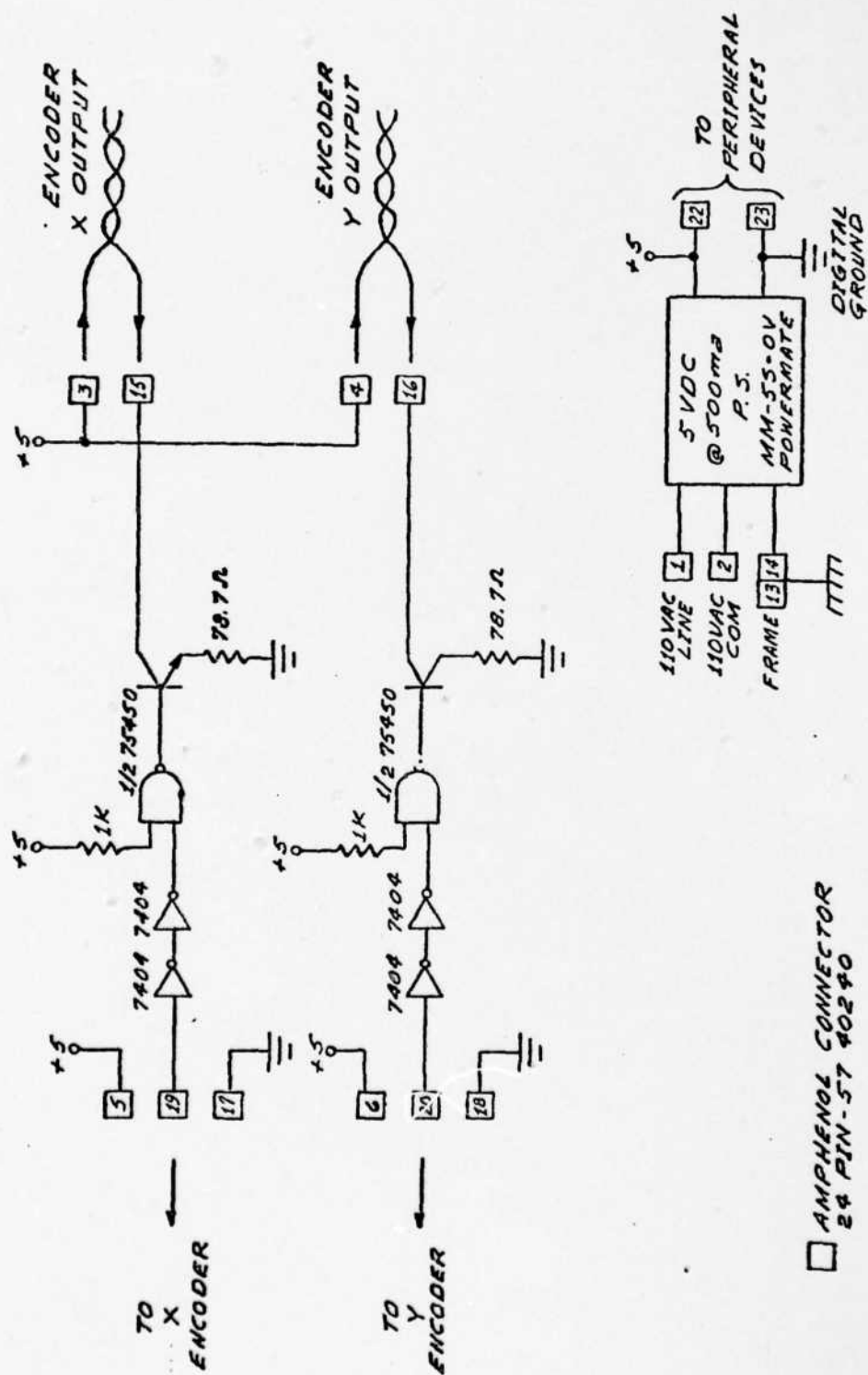
Connector at Calibrate Mirror Control Box

2.7

INTERFEROMETER X-Y ENCODERS (800 SERIES)



Interferometer X-Y Encoder Wiring Block Diagram



Interferometer X-Y Encoders

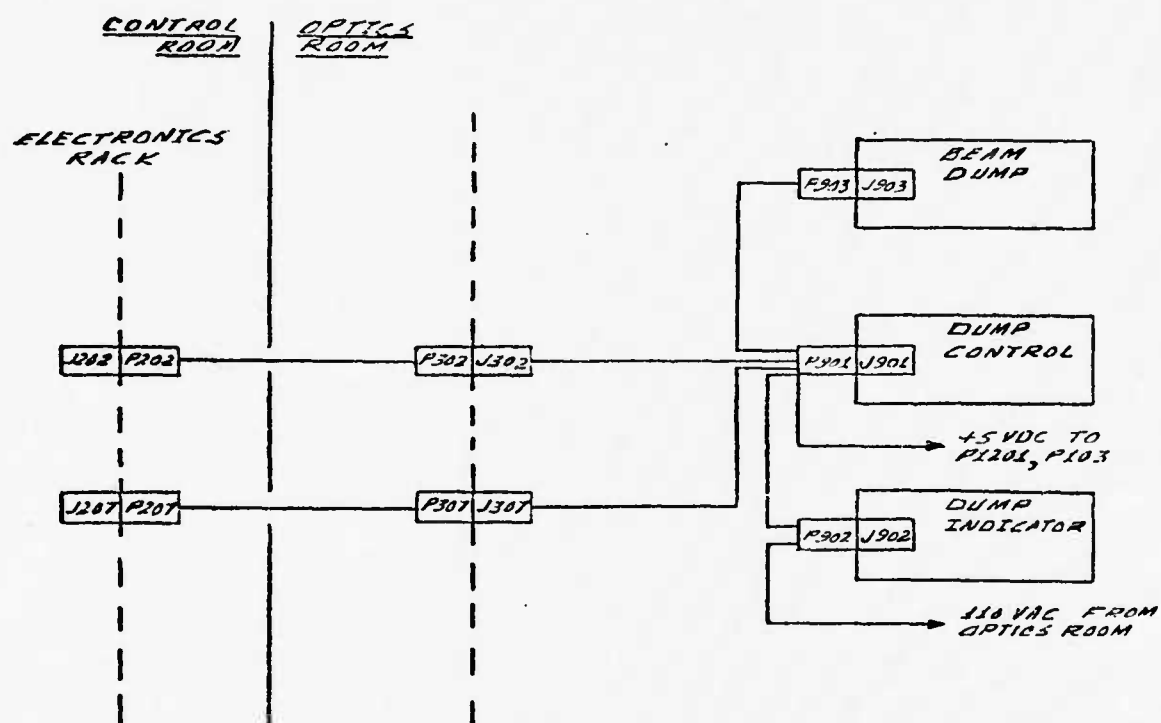
<u>110 VAC LINE</u>	<u>1</u>	<u>13</u>	<u>FRAME GND</u>
<u>110 VAC COM</u>	<u>2</u>	<u>14</u>	<u>FRAME GND</u>
<u>J303-1 ENCC X (+5V)</u>	<u>3</u>	<u>15</u>	<u>ENC X (X TO RACK J303-26)</u>
<u>J303-2 ENCC Y (+5V)</u>	<u>4</u>	<u>16</u>	<u>ENC Y (Y TO RACK J303-27)</u>
<u>+5VDC X ENCODER</u>	<u>5</u>	<u>17</u>	<u>X ENCODER COM</u>
<u>+5VDC Y ENCODER</u>	<u>6</u>	<u>18</u>	<u>Y ENCODER COM</u>
<u> </u>	<u>7</u>	<u>19</u>	<u>X ENCODER OUTPUT</u>
<u> </u>	<u>8</u>	<u>20</u>	<u>Y ENCODER OUTPUT</u>
<u> </u>	<u>9</u>	<u>21</u>	<u> </u>
<u> </u>	<u>10</u>	<u>22</u>	<u> </u>
<u> </u>	<u>11</u>	<u>23</u>	<u> </u>
<u> </u>	<u>12</u>	<u>24</u>	<u> </u>

P13 001

Connector at Interferometer X-Y Encoder Box

2.8

PHOTOMETER BEAM DUMP (900 SERIES)



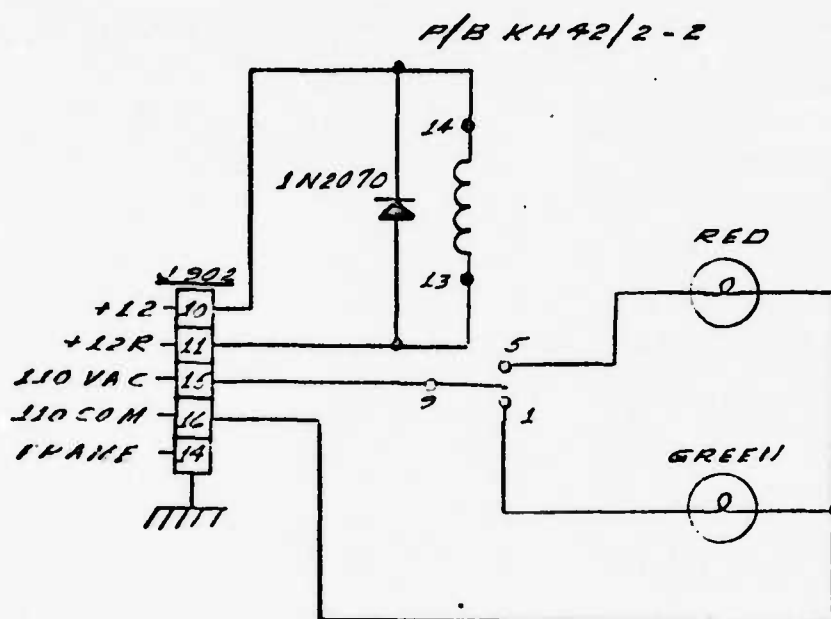
Beam Dump Harness Layout Block Diagram

14 Sept 73

<u>110VAC LINE</u>	<u>1</u>	<u>13</u>	<u>FRAME GND</u>
<u>110VAC COM</u>	<u>2</u>	<u>14</u>	<u>FRAME GND</u>
<u>+SOLENOID P-903A</u>	<u>3</u>	<u>15</u>	<u>+12VDC J307-3</u>
<u>COM SOLENOID P-903P</u>	<u>4</u>	<u>16</u>	<u>12VDC FET P302-11</u>
	<u>5</u>	<u>17</u>	<u>+5VDC J302-5</u>
<u>DUMP-C J302-6</u>	<u>6</u>	<u>18</u>	<u>BEAM DUMP J302-30</u>
<u>DUMP ST J302-31</u>	<u>7</u>	<u>19</u>	
	<u>8</u>	<u>20</u>	
<u>12VDC P.901-10</u>	<u>9</u>	<u>21</u>	
	<u>10</u>	<u>22</u>	
	<u>11</u>	<u>23</u>	
	<u>12</u>	<u>24</u>	<u>+12VDC FET J307-10</u>

P/J 901

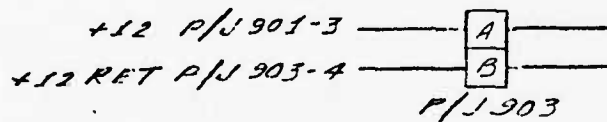
Connector at Photometer Beam Dump Control Unit



Beam Dump Indicator

	1	13	
	2	14	FRAME GND
	3	15	110 VAC LINE
	4	16	110 VAC COM
	5	17	
	6	18	
	7	19	
	8	20	
	9	21	
+12VDC P901-9	10	22	
+12RET P901-16	11	23	
	12	24	

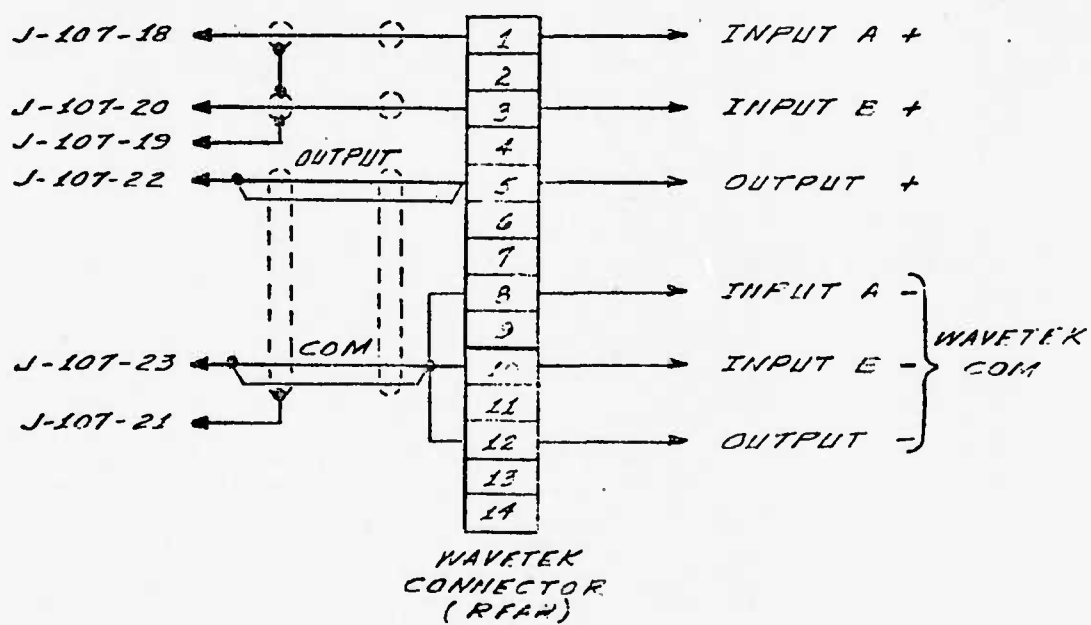
P/J 902



Connectors at Beam Dump Indicator and Beam Dump

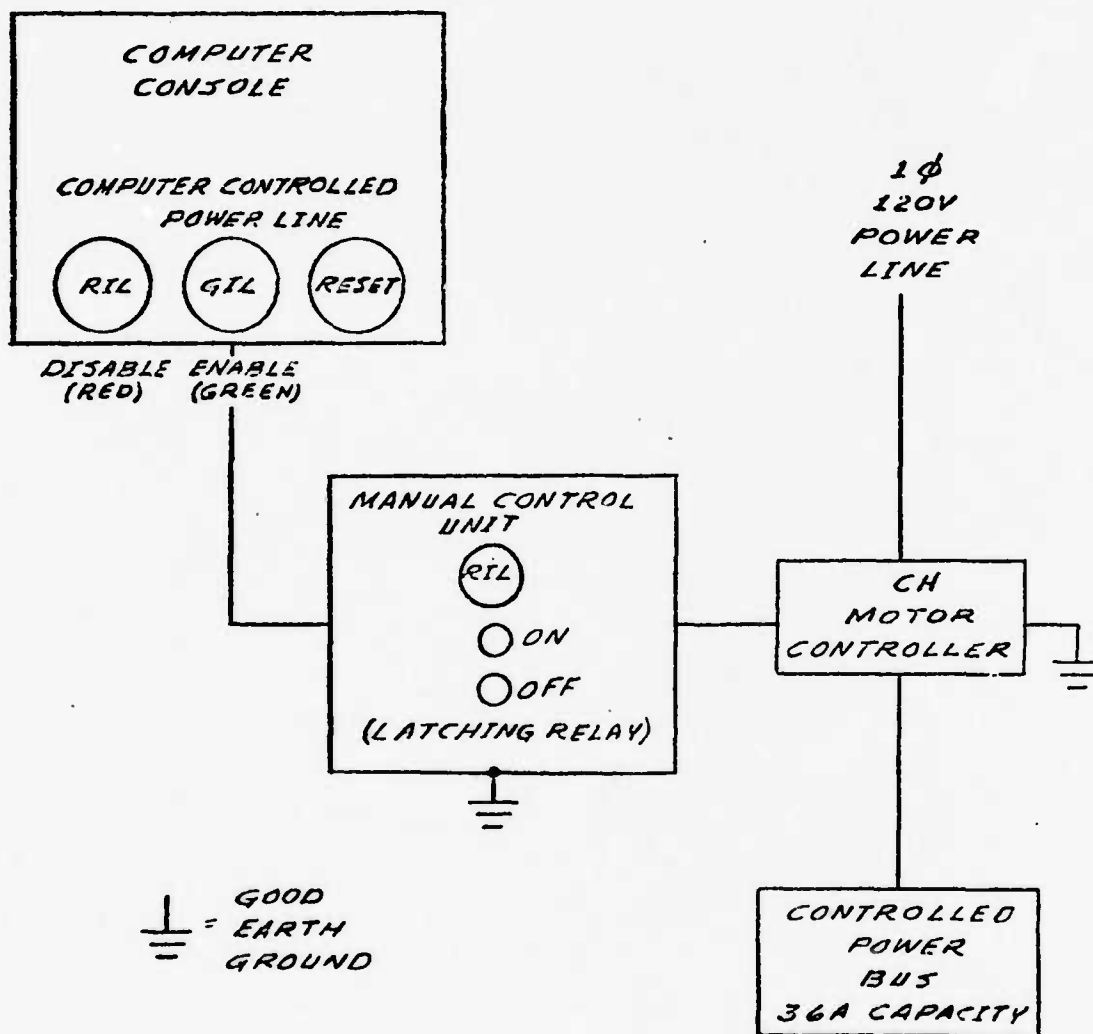
2.9

WAVETEK INTERCONNECTING CABLE (1000 SERIES)

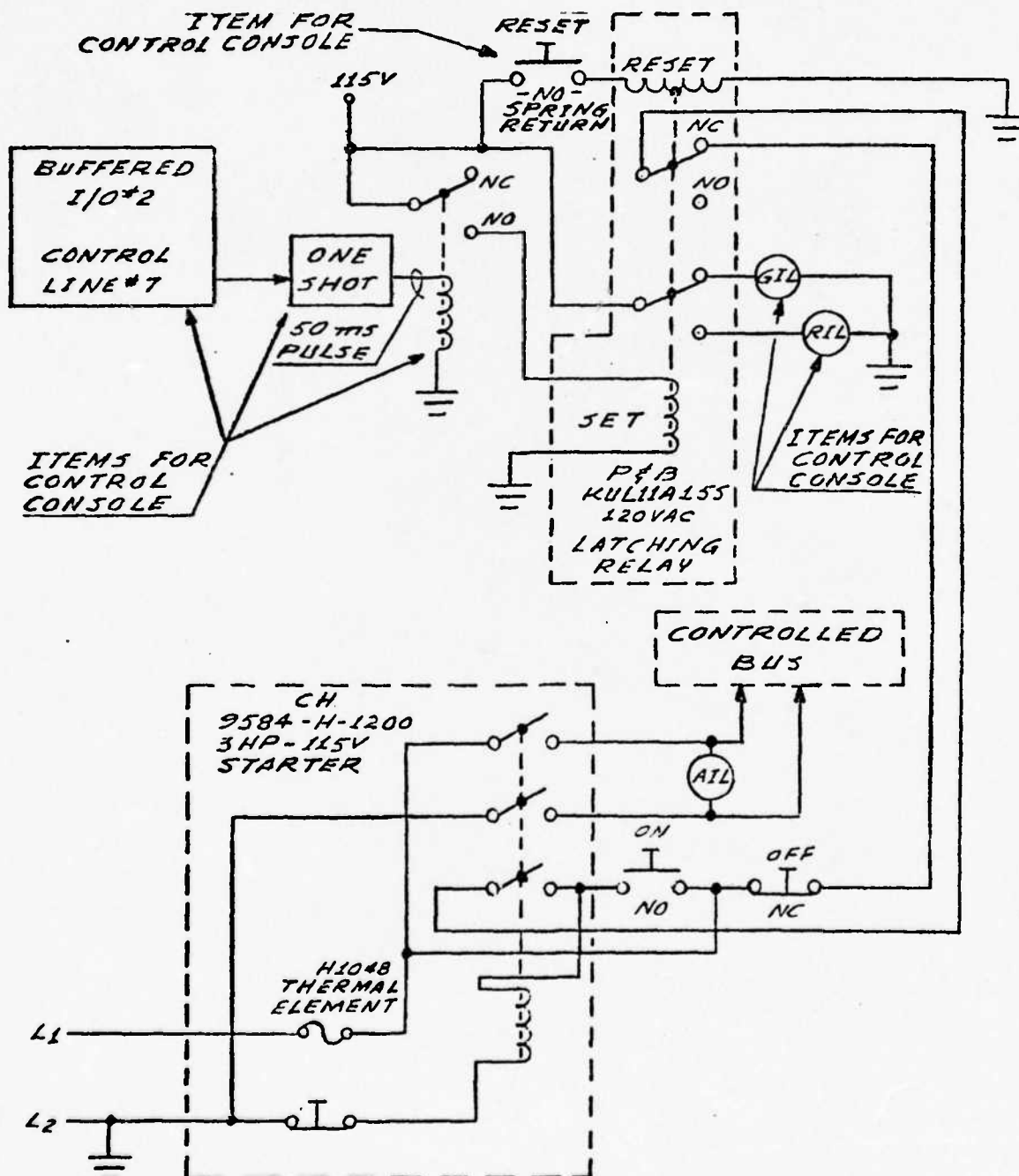


2.10

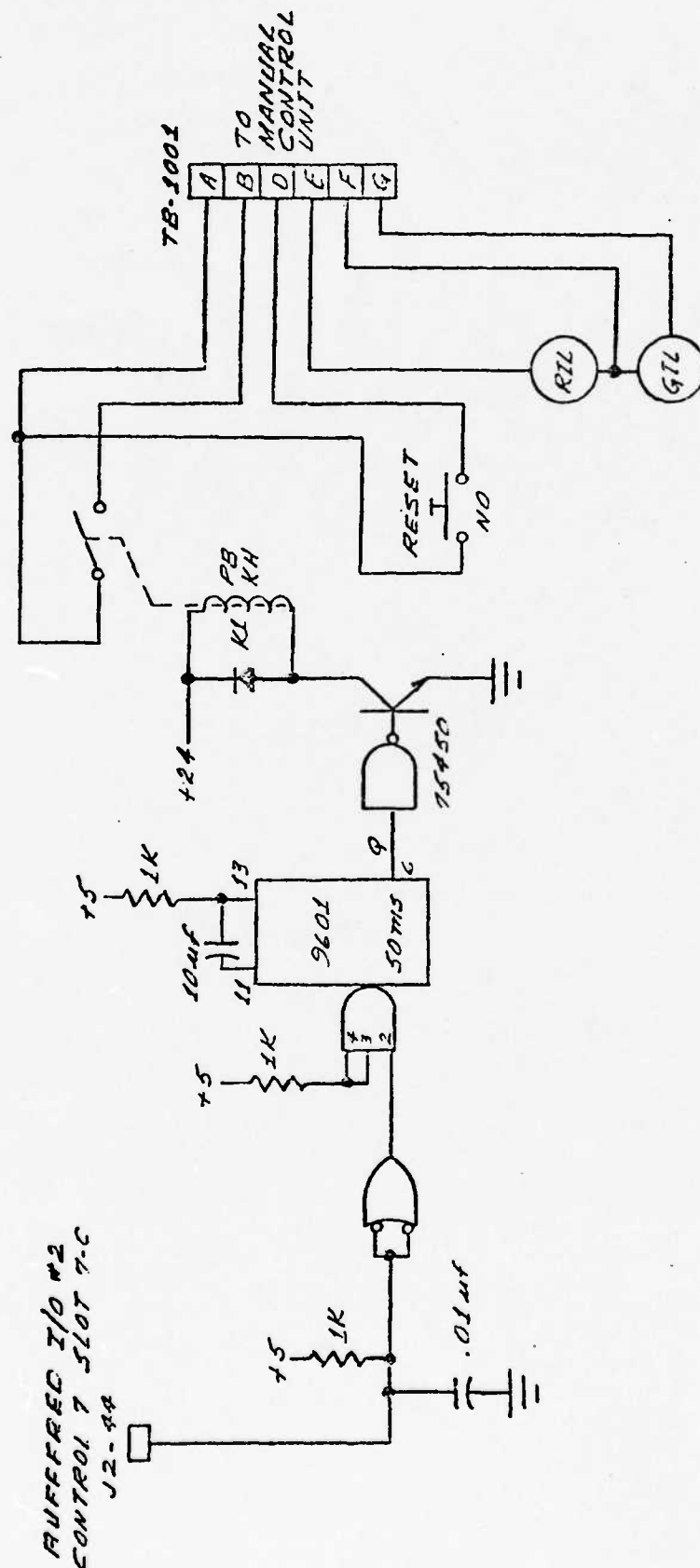
COMPUTER-CONTROLLED POWER BUS (1100 SERIES)



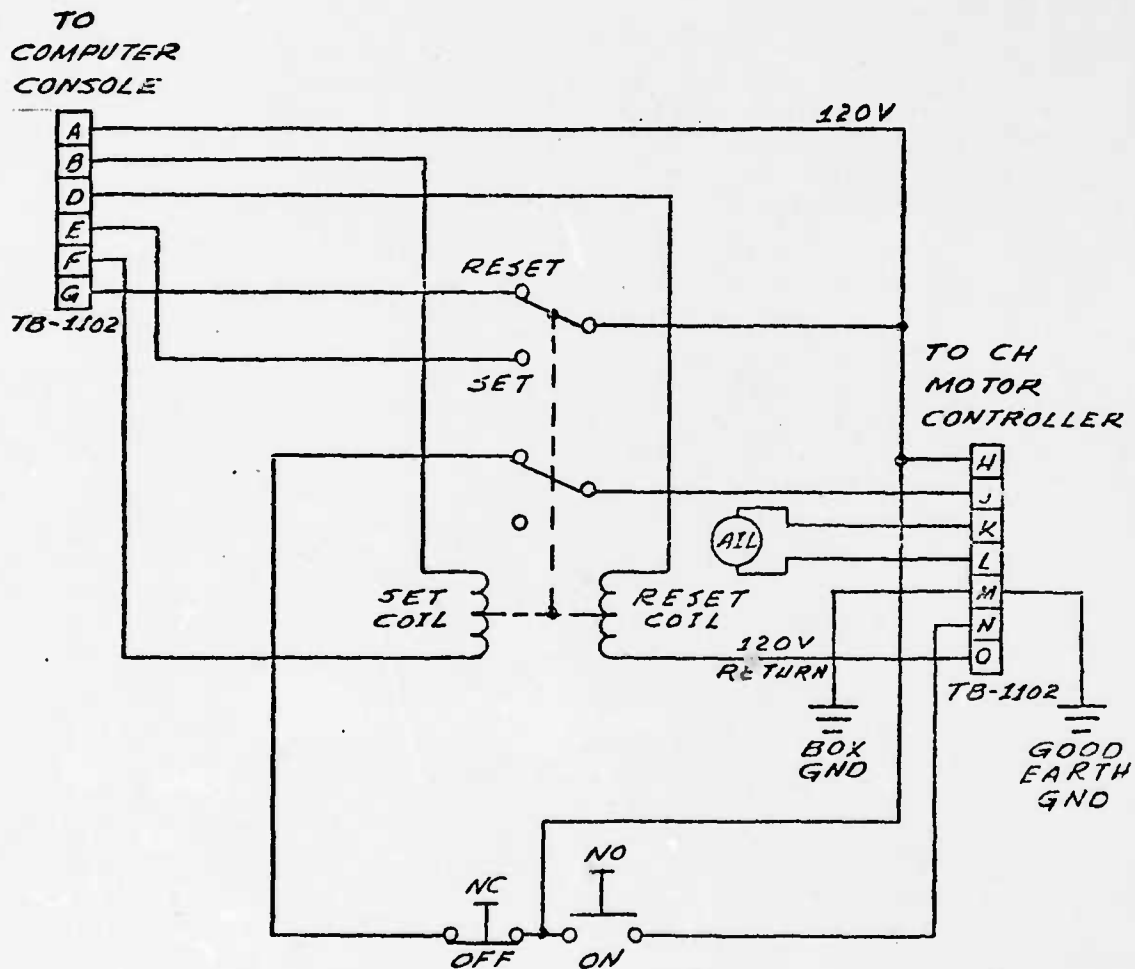
Computer-Controlled Power Bus (1 of 5, Block Diagram)



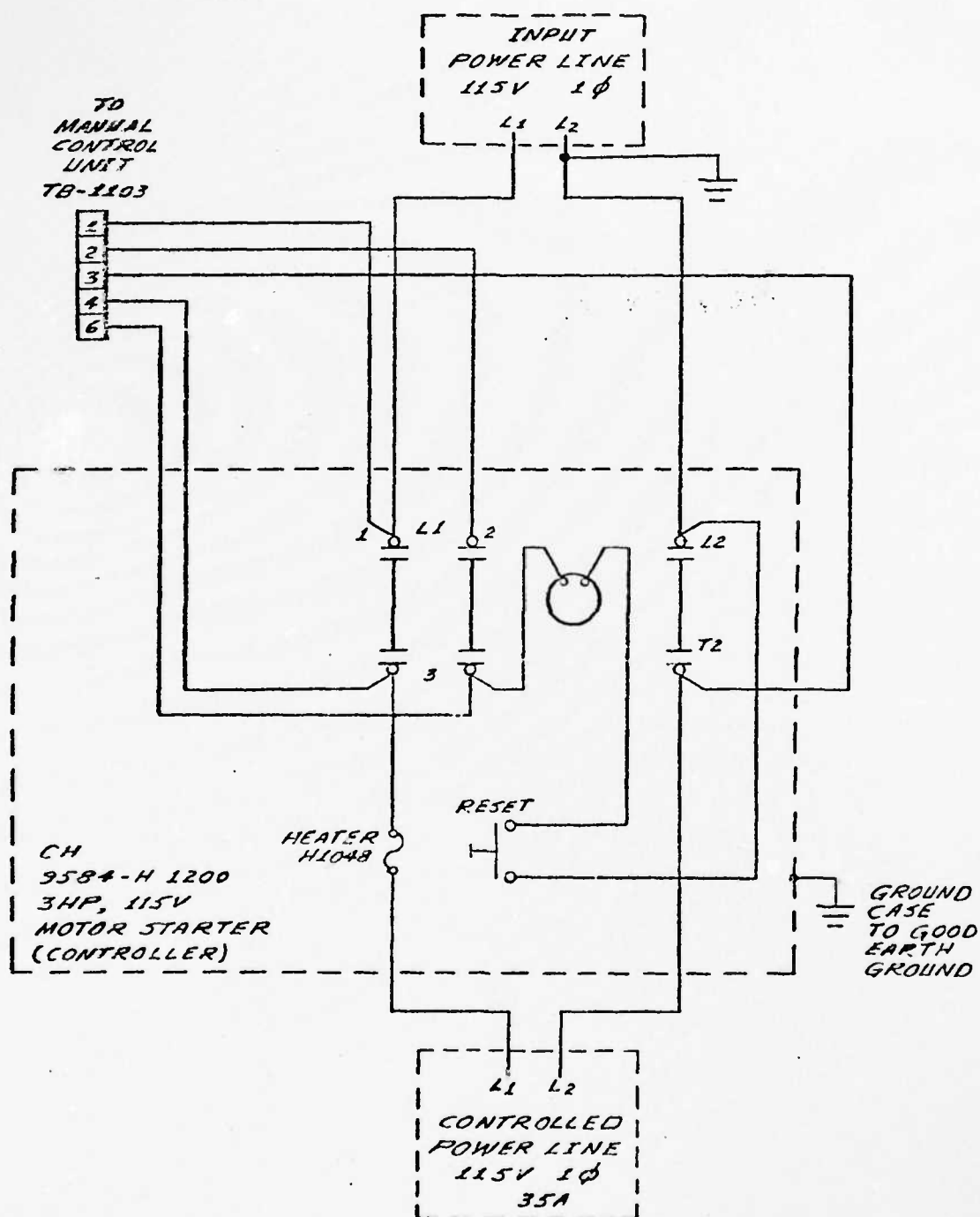
Computer-Controlled Power Bus (2 of 5, Wiring Schematic)



Computer-Controlled Power Bus (3 of 5, Computer Console Components)

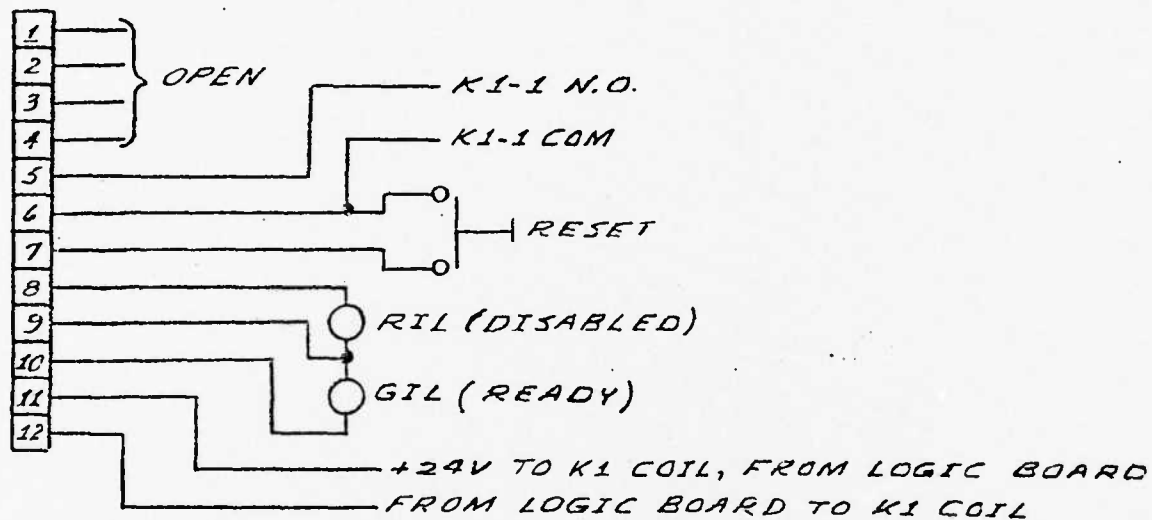


Computer-Controlled Power Bus (4 of 5, Manual Control Unit)

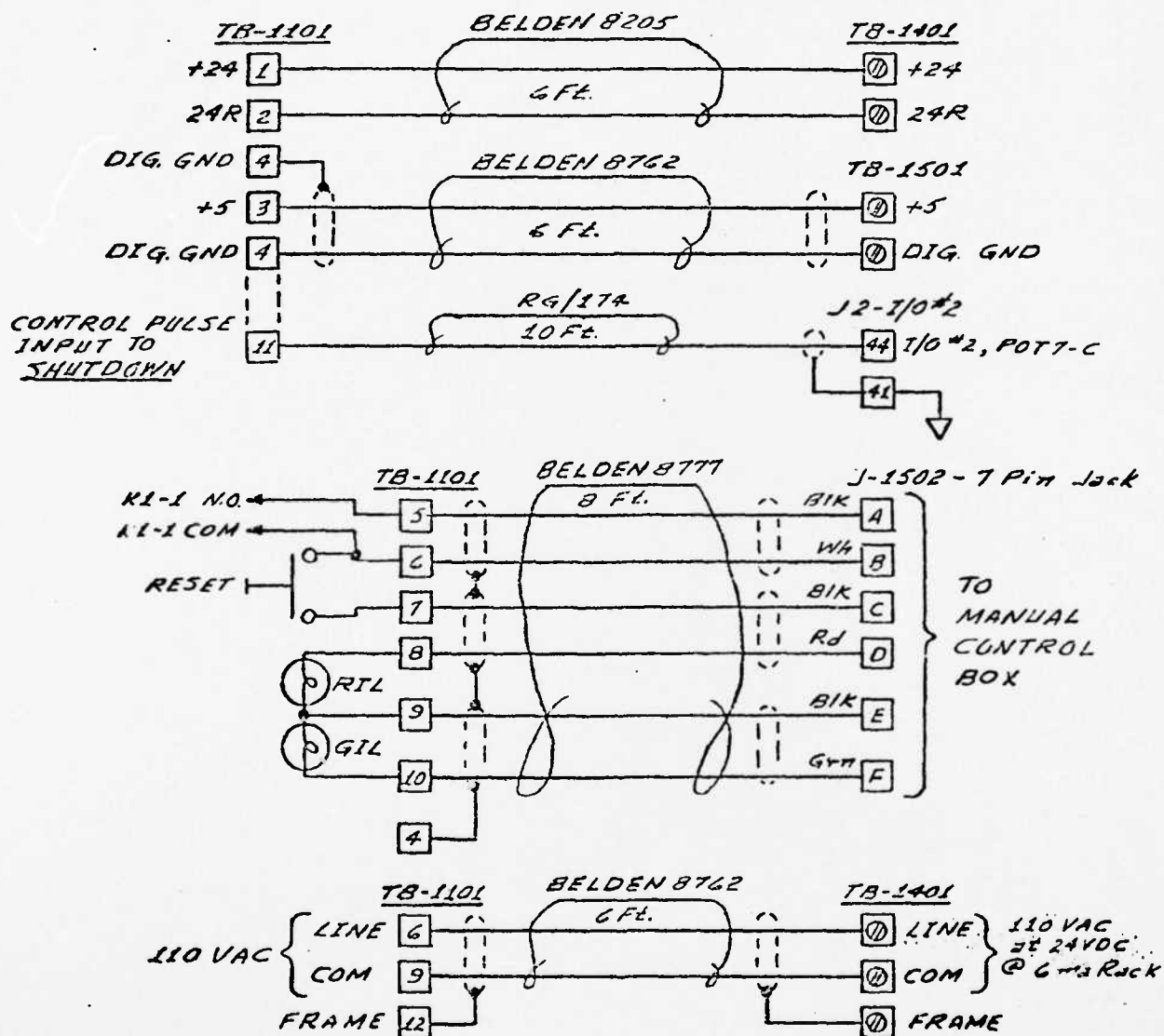


Computer-Controlled Power Bus (5 of 5, Reset Control Wiring)

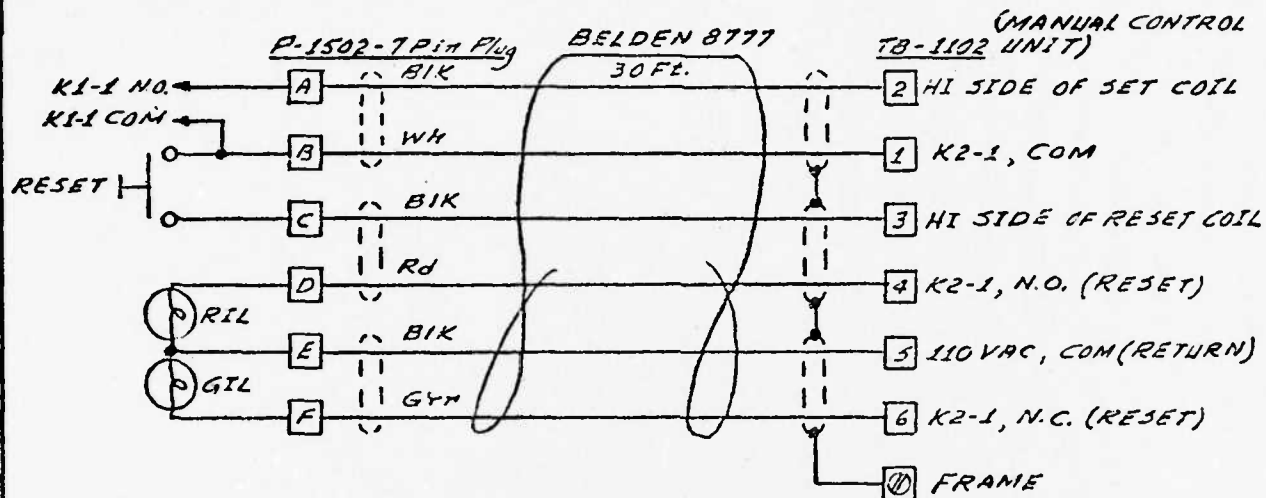
78-1101



110 VAC : HI ON -6
 : COM ON -9
 PANEL GROUNDED
 THRU SHIELD ON 110V
 CABLE TO 24 VDC PANEL



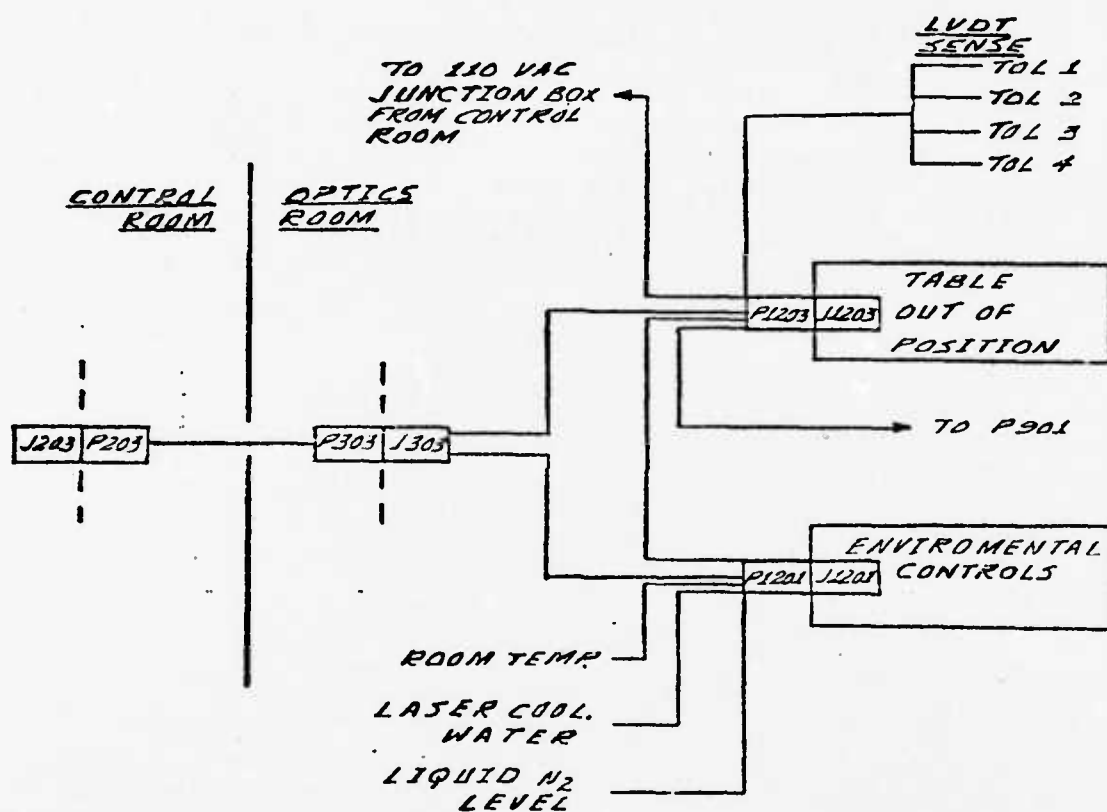
Terminal Boards and Cabling for Computer-Controlled Power Bus
(Sheet 1 of 2)



Terminal Boards and Cabling for Computer-Controlled Power Bus
(Sheet 2 of 2)

2.11

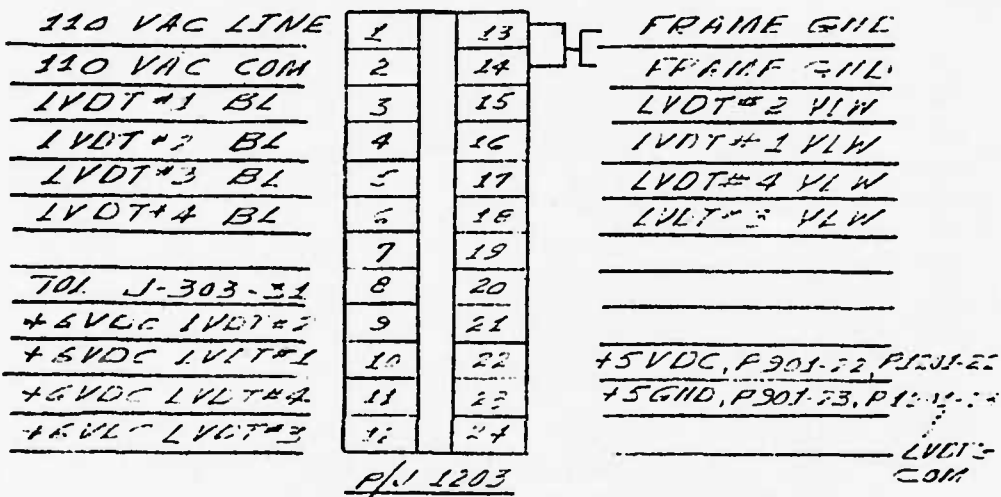
ENVIRONMENTAL ALARM SYSTEM (1200 SERIES)



Environmental Controls Wiring Block Diagram

<u>110 VAC LN₂ L</u>	<u>1</u>	<u>23</u>	
<u>110 VAC COM LN₂ L</u>	<u>2</u>	<u>24</u>	
<u>LN₂ L COM J303-3</u>	<u>3</u>	<u>25</u>	<u>110 VAC CWF</u>
<u>LN₂ L J303-28</u>	<u>4</u>	<u>26</u>	<u>110 VAC CWF SHH</u>
<u>CWF COM J303-4</u>	<u>5</u>	<u>27</u>	<u>RTW +5</u>
<u>CWF J303-24</u>	<u>6</u>	<u>28</u>	<u>RTW +5 RFT</u>
<u>RTW COM J303-5</u>	<u>7</u>	<u>29</u>	
<u>RTW J303-30</u>	<u>8</u>	<u>20</u>	
	<u>9</u>	<u>21</u>	
	<u>10</u>	<u>22</u>	<u>+5 VDC P1203-22</u>
	<u>11</u>	<u>23</u>	<u>DIG SHH P1203-25</u>
<u>SHIELDS</u>	<u>12</u>	<u>24</u>	

P/J 1202



Connector at Table-Out-of-Position Control Box

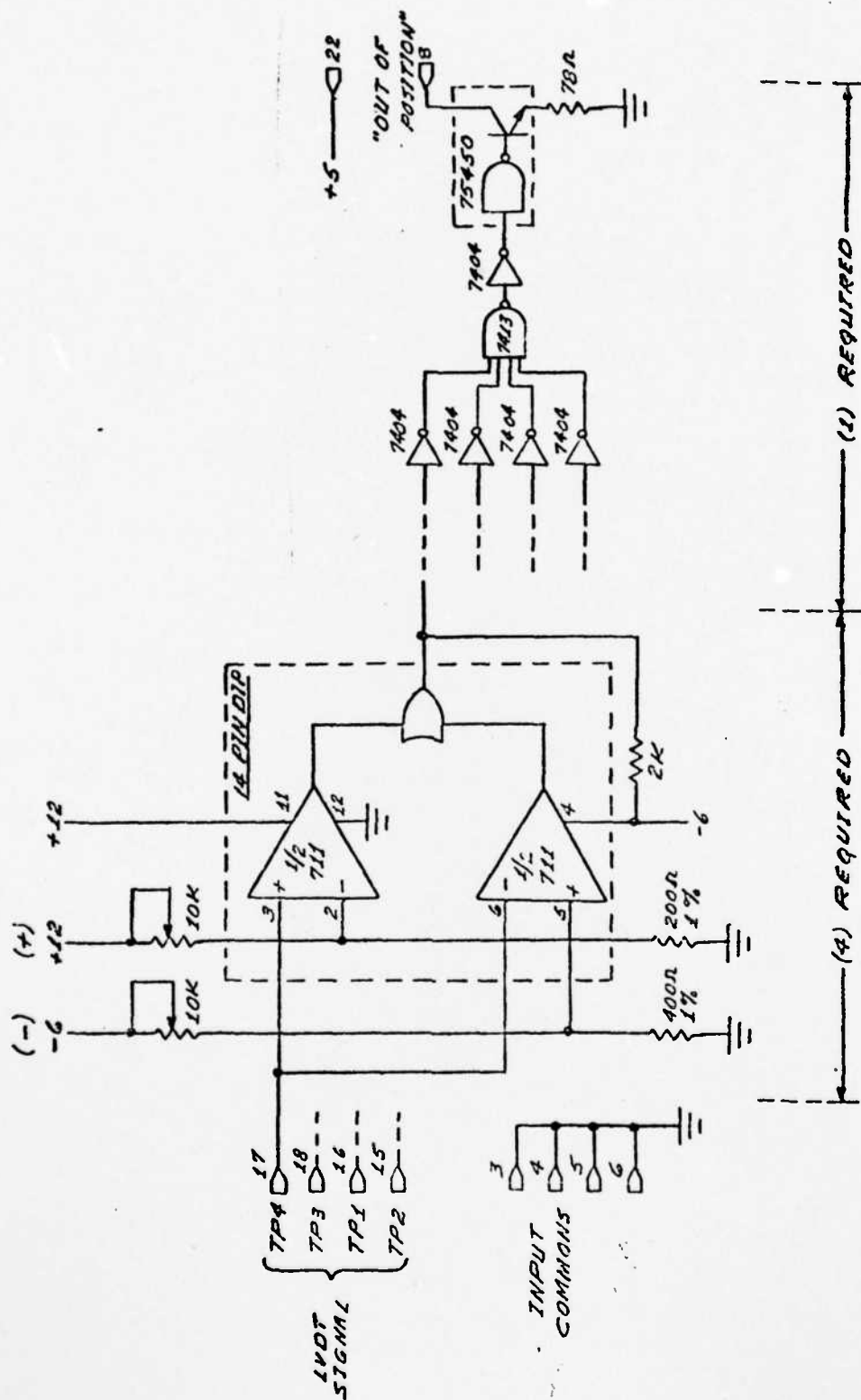
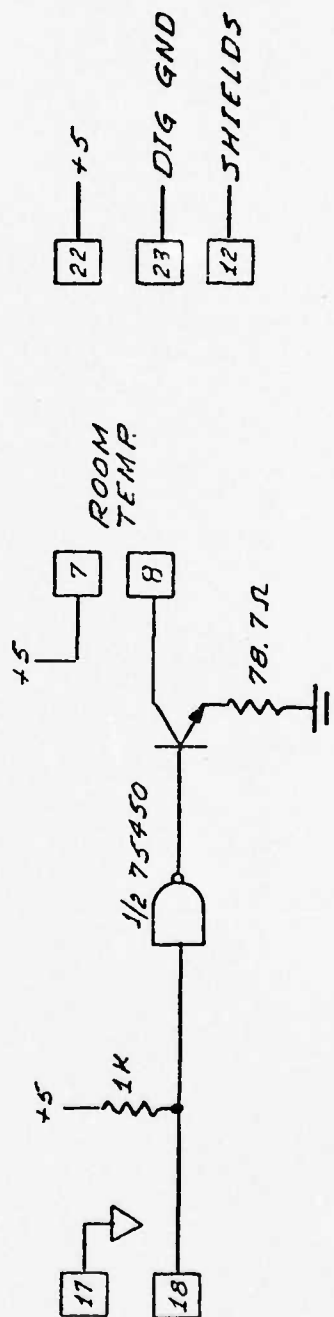
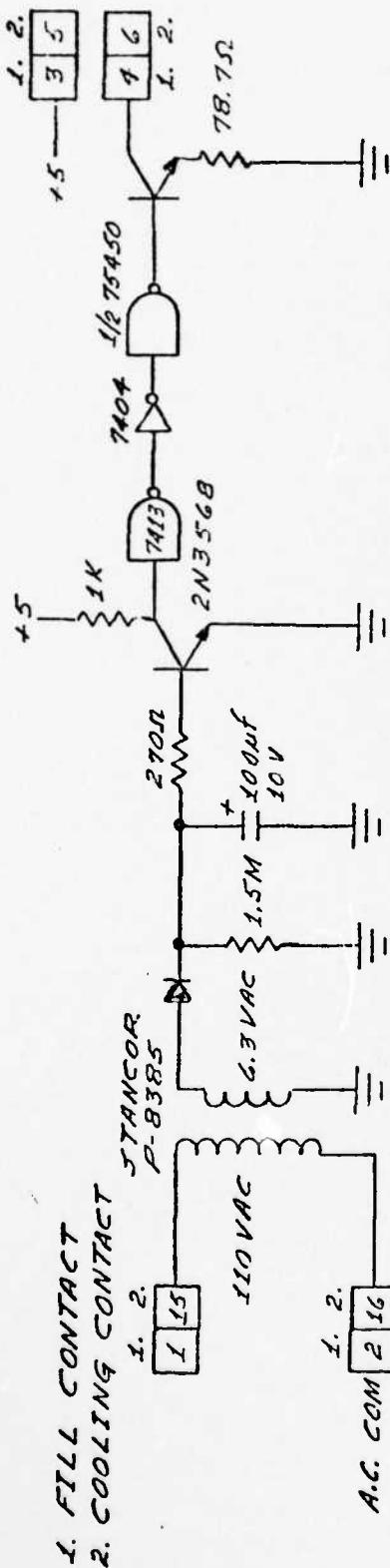


Table-Out-of-Position Sensor

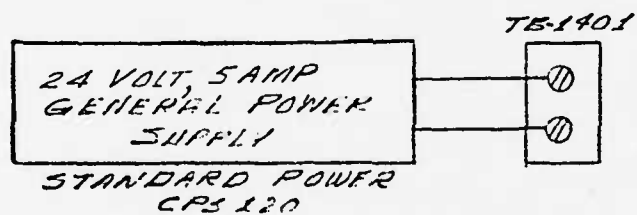
1. LIQUID N₂ LOW
2. COOLING WATER FAILURE

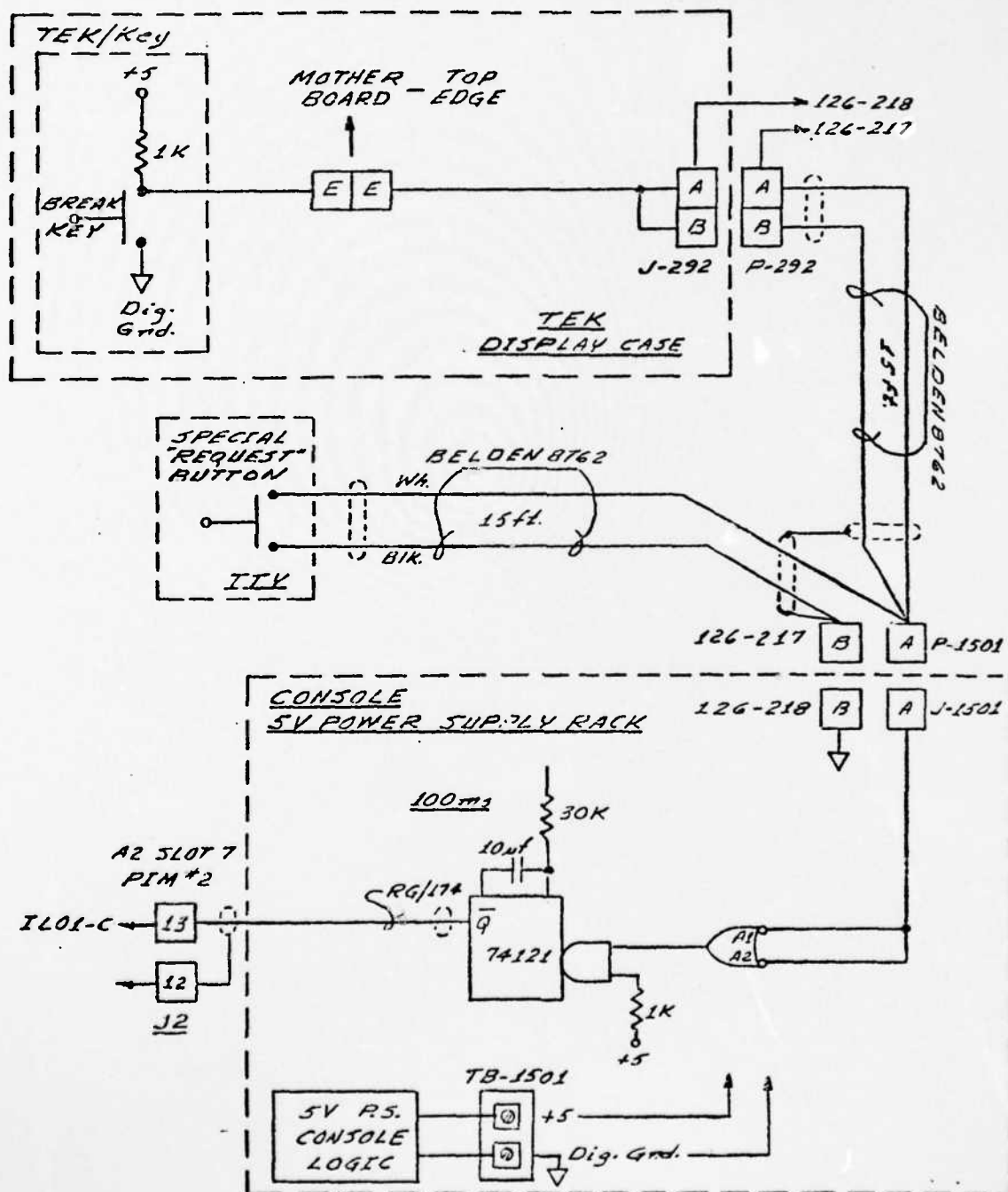


Optics Room Warning Circuits

2.12

OPERATOR MANUAL INTERVENTION CIRCUITS AND 5
24-VOLT POWER SUPPLIES (1400, 1500 SERIES)





Operator Manual Intervention Circuit

AD-A039 811

DAYTON UNIV OHIO RESEARCH INST

F/G 20/5

LASER WINDOW TEST APPARATUS OPERATION AND MAINTENANCE MANUAL (F--ETC(U)

MAY 75

F29601-73-C-0124

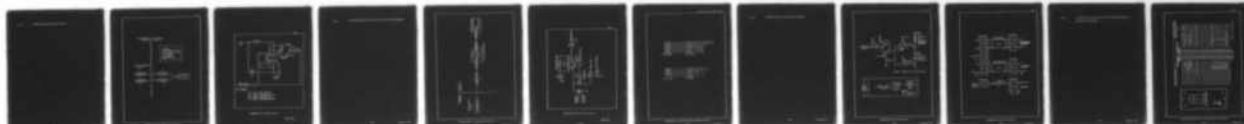
UNCLASSIFIED

AFWL-TR-75-150-VOL-3

NL

2 OF 2

AD-A039 811



END

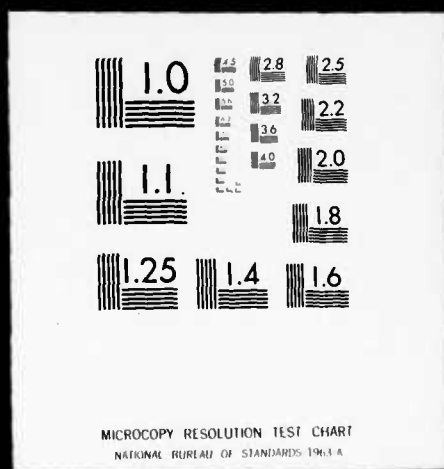
DATE

FILMED

6-77

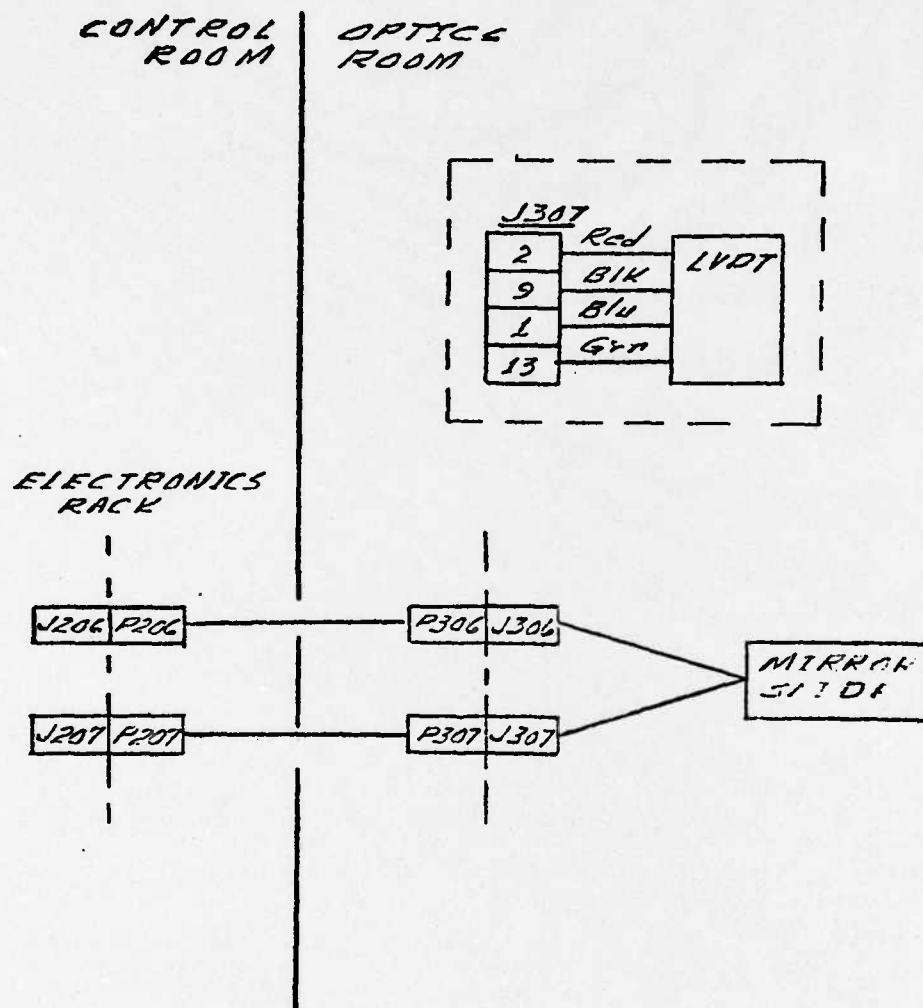
2 OF 2

ADAO39 811



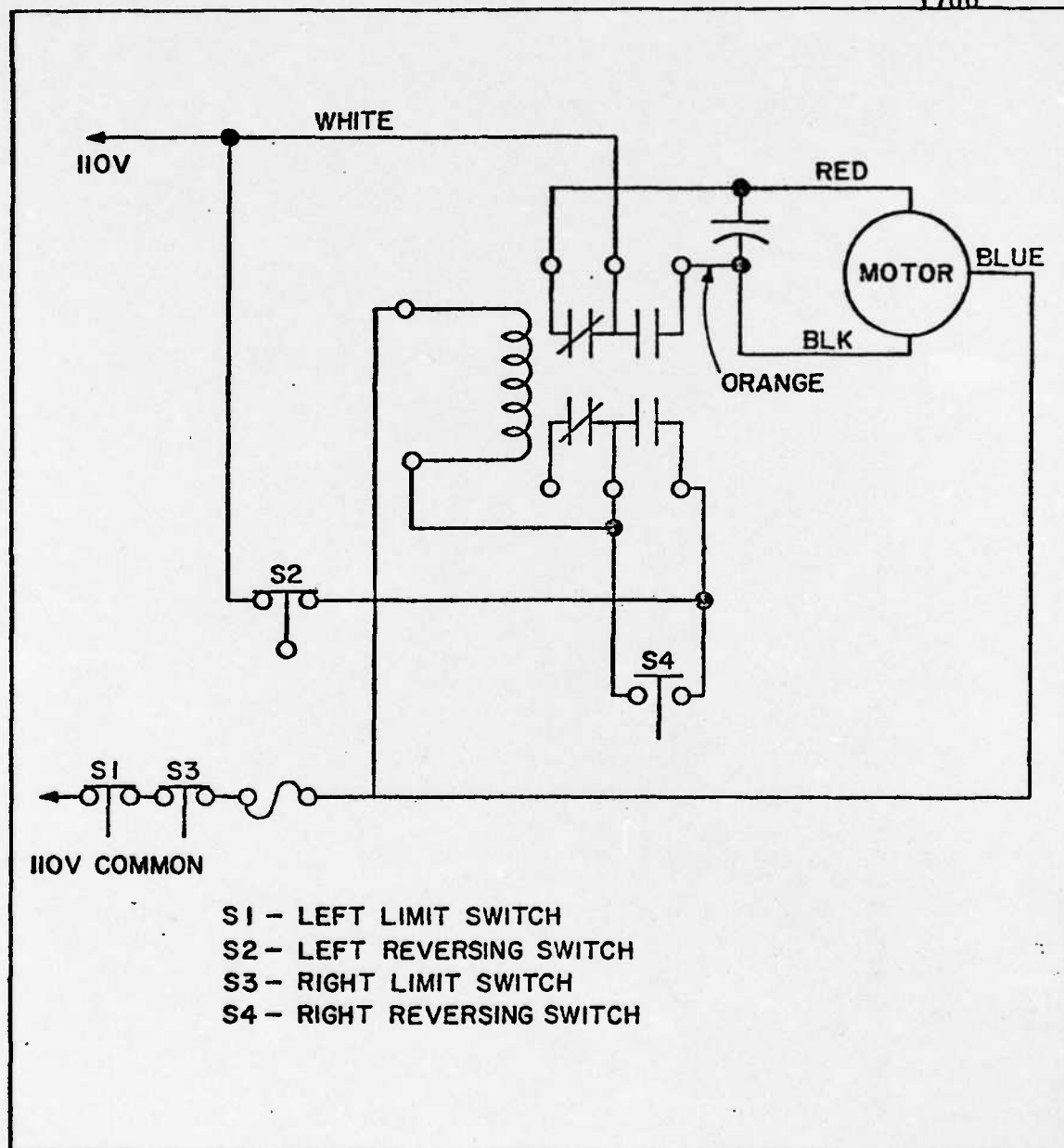
2.13

DOPPLER MIRROR (1700 SERIES)



Doppler Mirror Wiring Block Diagram

1700

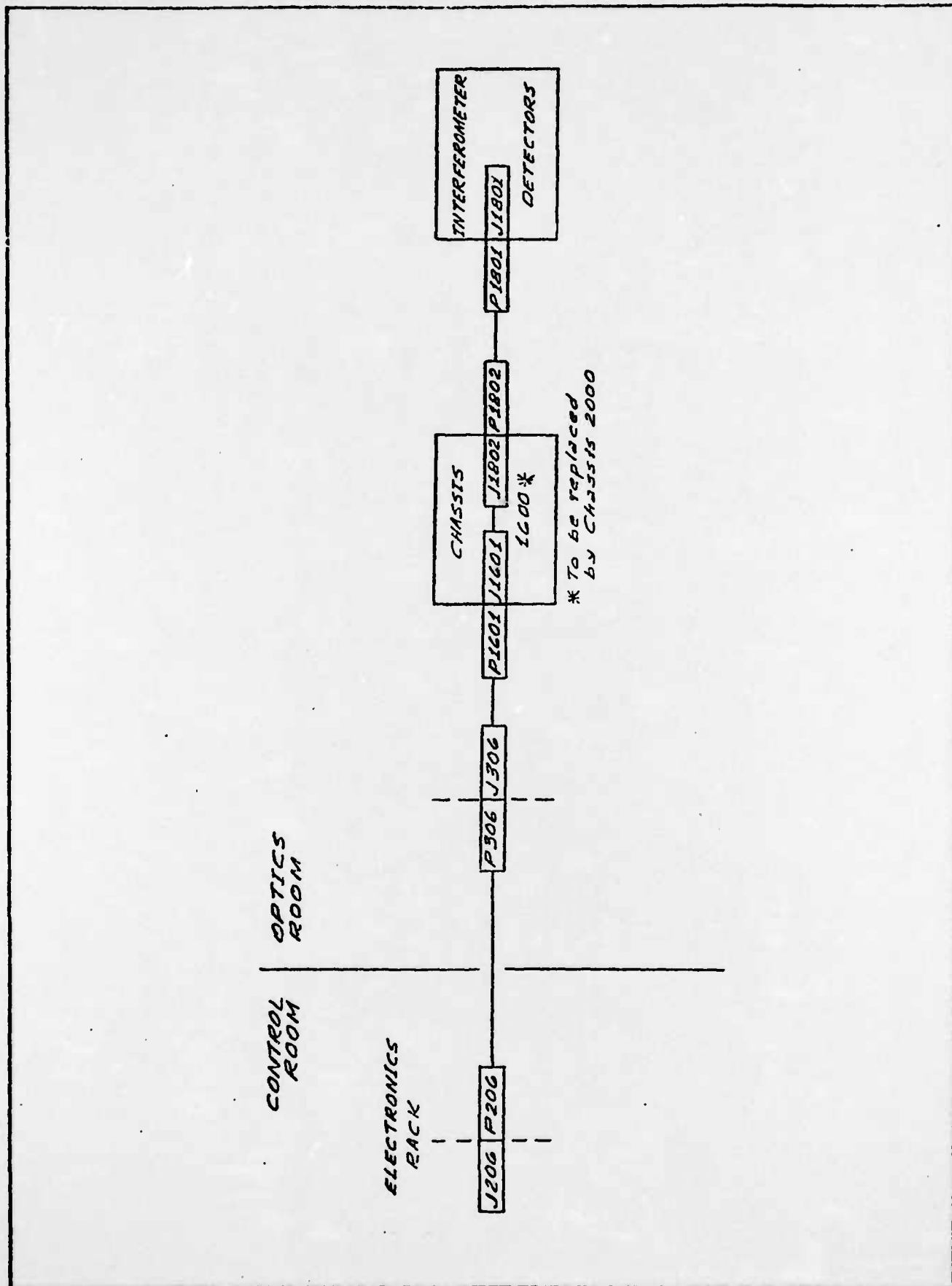


Doppler Mirror Motor Control

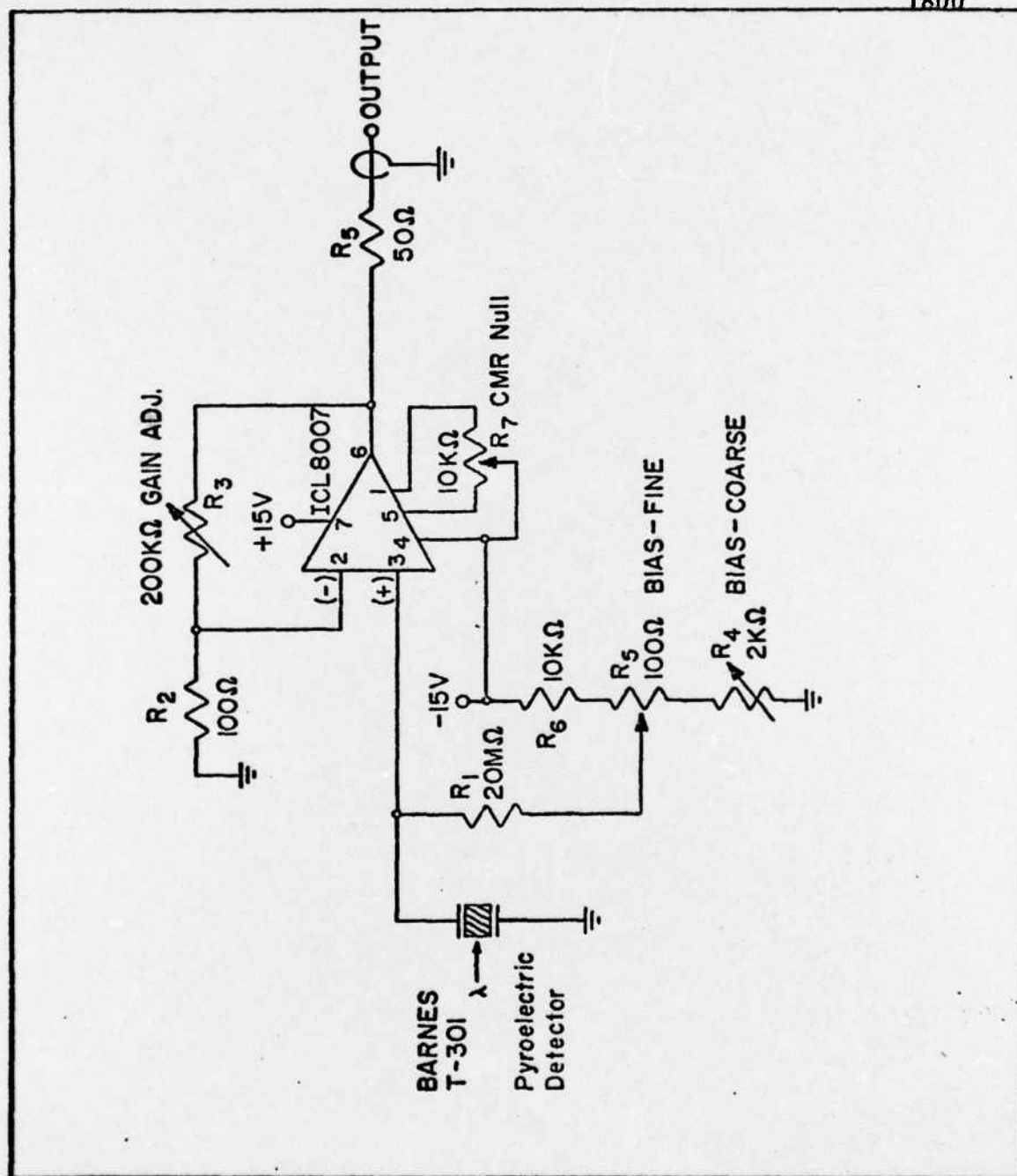
May 1975

2.14

INTERFEROMETER DETECTOR CIRCUITS (1800 SERIES)

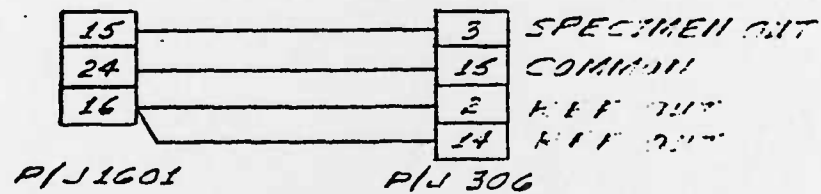
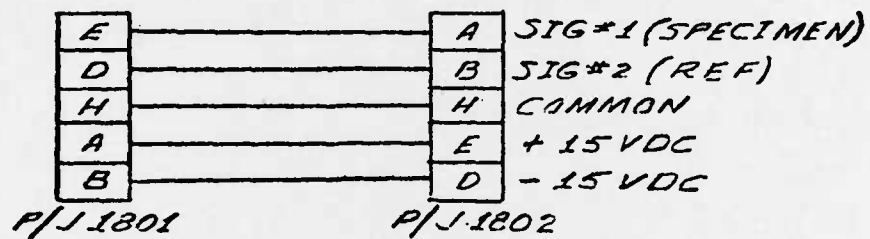


Interferometer Wiring Block Diagram



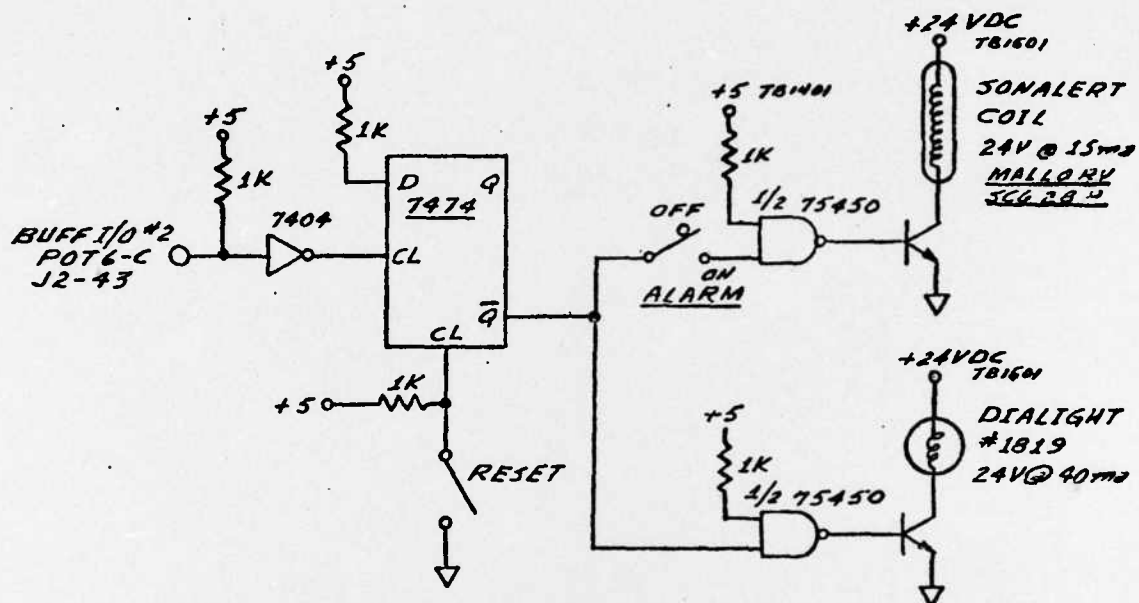
Interferometer Detector Circuits

May 1975

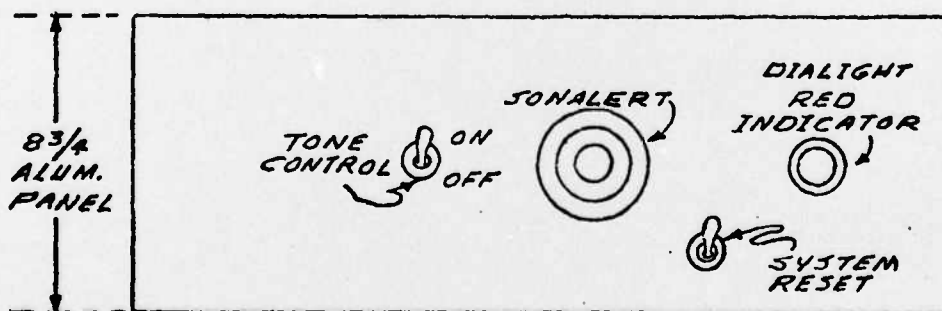


2.15

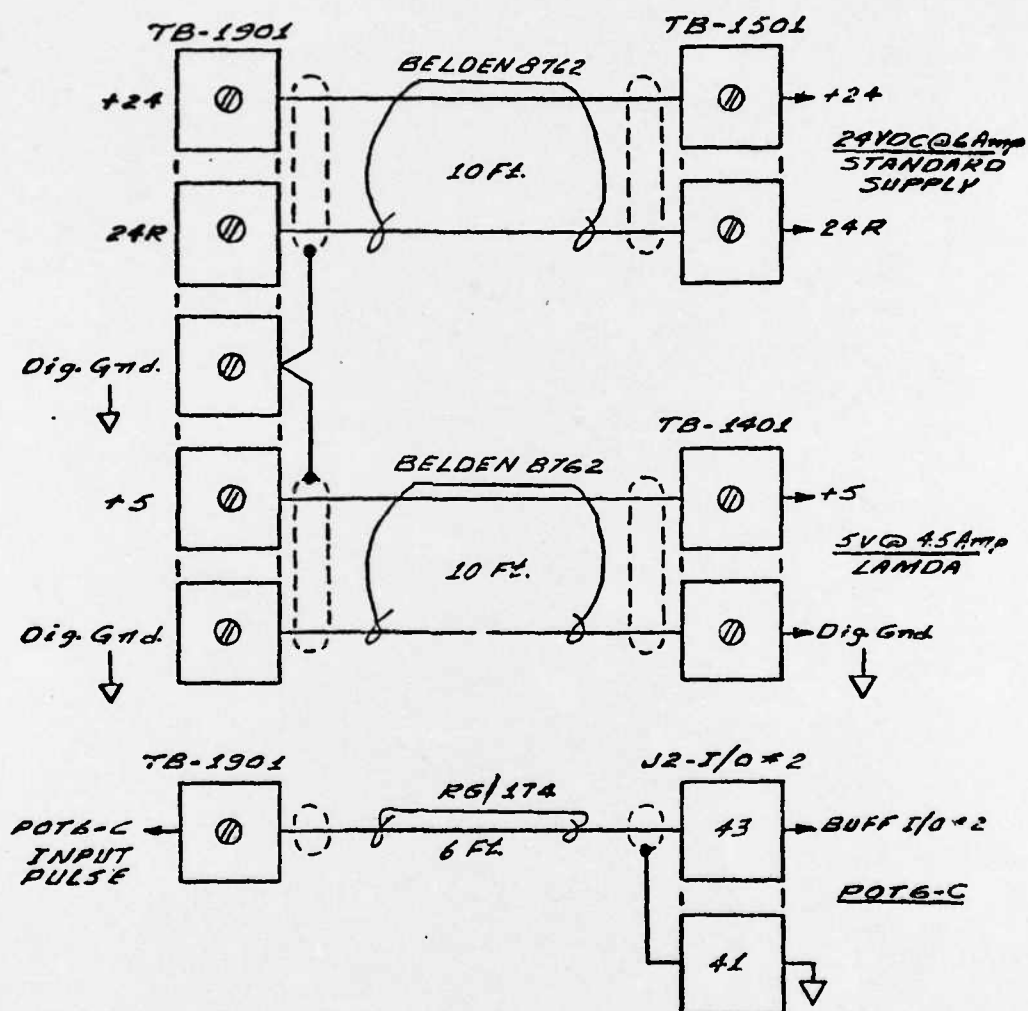
AUDIBLE/VISUAL ALARM (1900 SERIES)



MOUNT BOARD ON STAND-OFFS



Audible/Visual Alarm Circuit



Audible/Visual Alarm Harness

2.16

REVISED FRAME AND QUAD SYNC PULSE GENERATOR
CHASSIS (2000 SERIES)

EXTERNAL CONNECTIONS
FROM BACK PLANE
RACK CONNECTOR

26-4200-32A

J2001

1	1
2	2
3	3
4	4
5	5
6	6
7	7
8	8
9	9
10	10
11	11
12	12
13	13
14	14
15	15
16	16
17	17
18	18
19	19
20	20
21	21
22	22
23	23
24	24
25	25
32	32

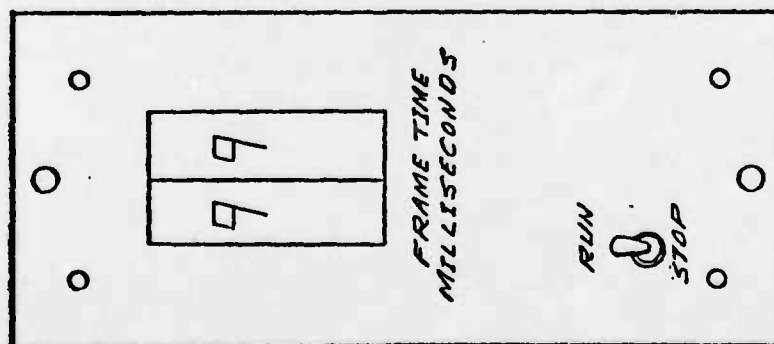
PLUG-IN MODULE
INTERNAL CONNECTIONS

26-4100-32P

P2001

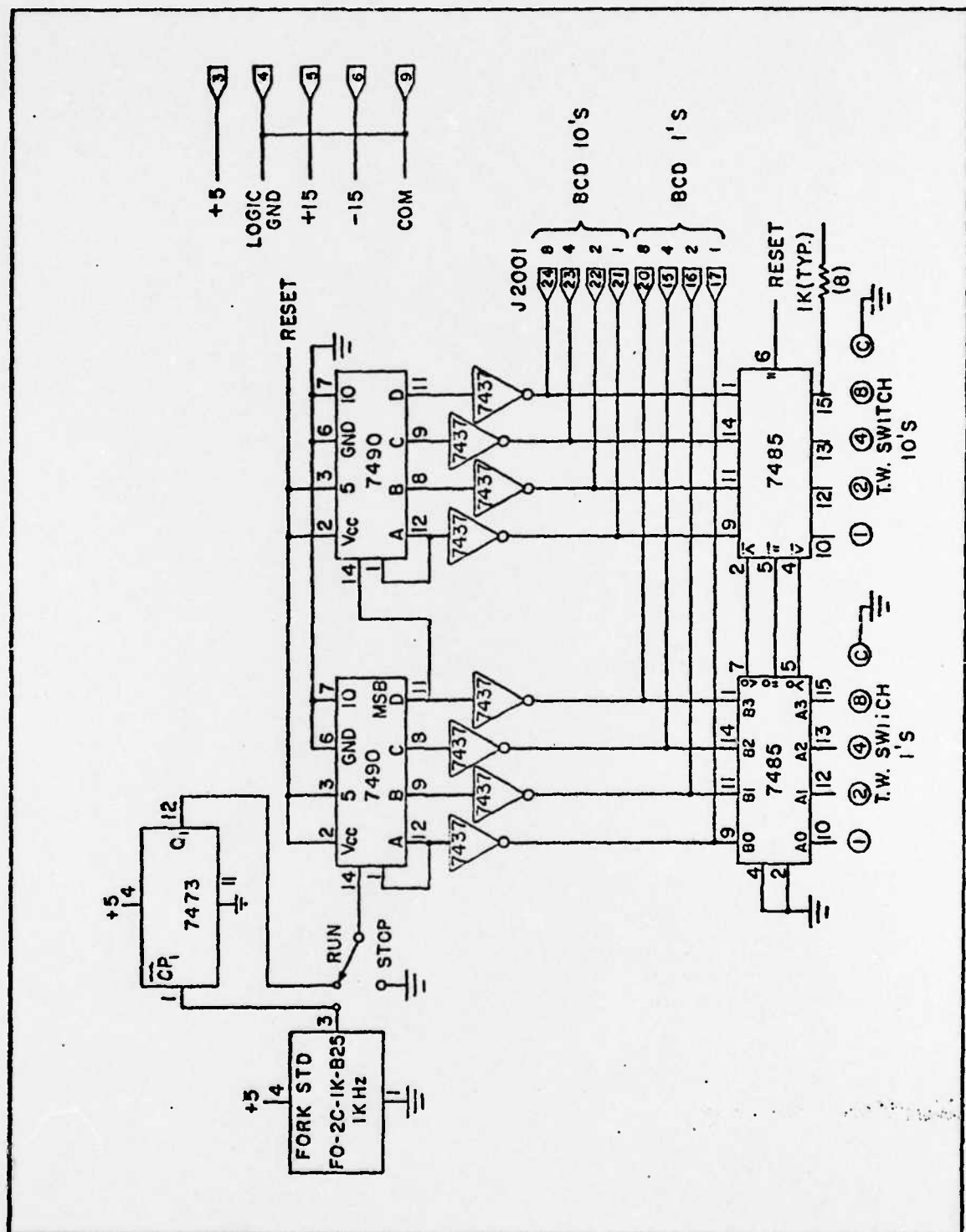
1	1
2	2
3	3
4	4
5	5
6	6
7	7
8	8
9	9
10	10
11	11
12	12
13	13
14	14
15	15
16	16
17	17
18	18
19	19
20	20
21	21
22	22
23	23
24	24
25	25
32	32

+5VDC
LOGIC GND
+15VDC
-15VDC
ANALOG GND
BCD1 "1"
BCD1 "2"
BCD1 "4"
BCD1 "8"
BCD10 "1"
BCD10 "2"
BCD10 "4"
BCD10 "8"



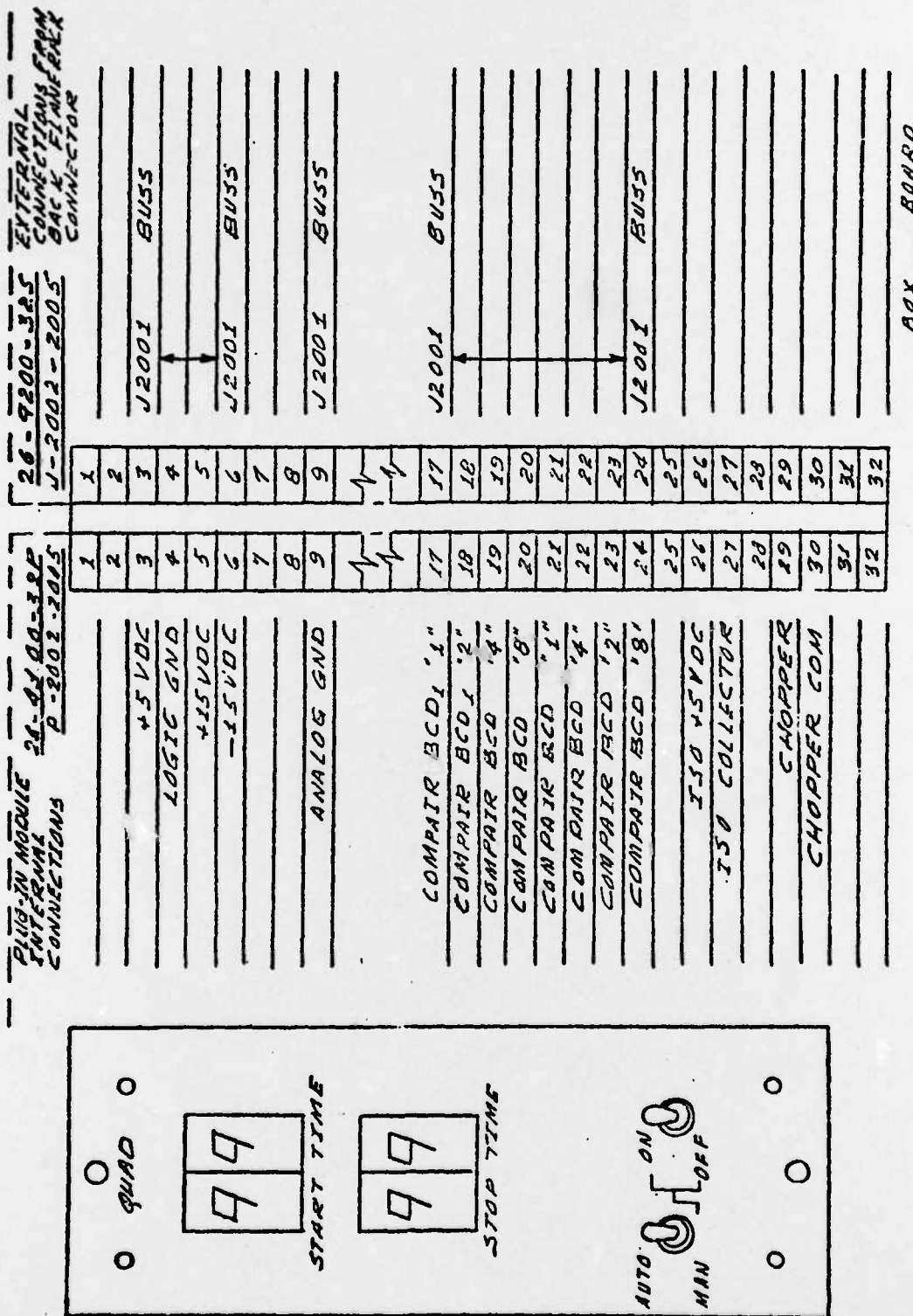
Frame and Quad Sync Clock Generator Connections

BOX BOARD

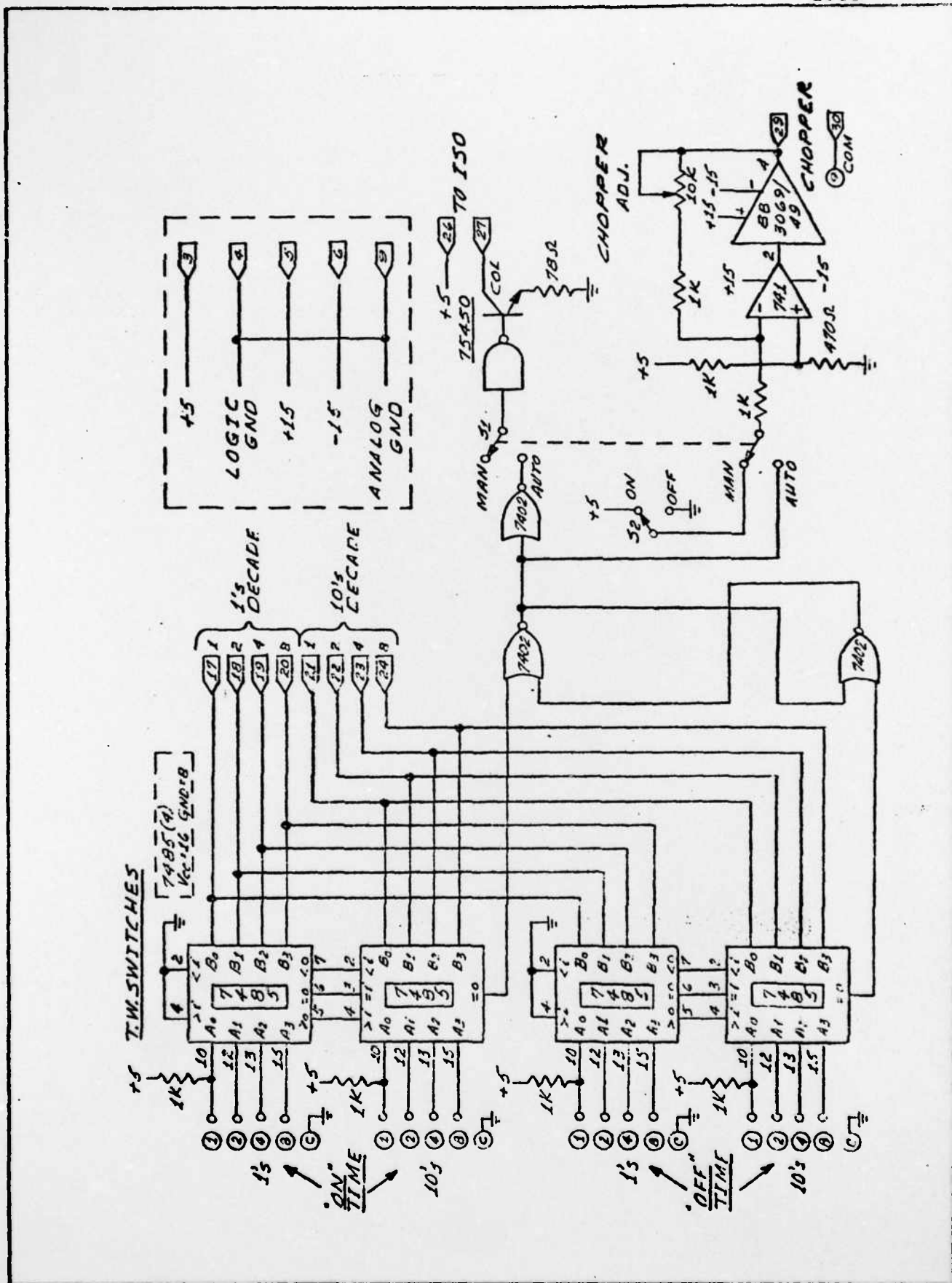


Frame and Quad Sync Clock Generator Diagram

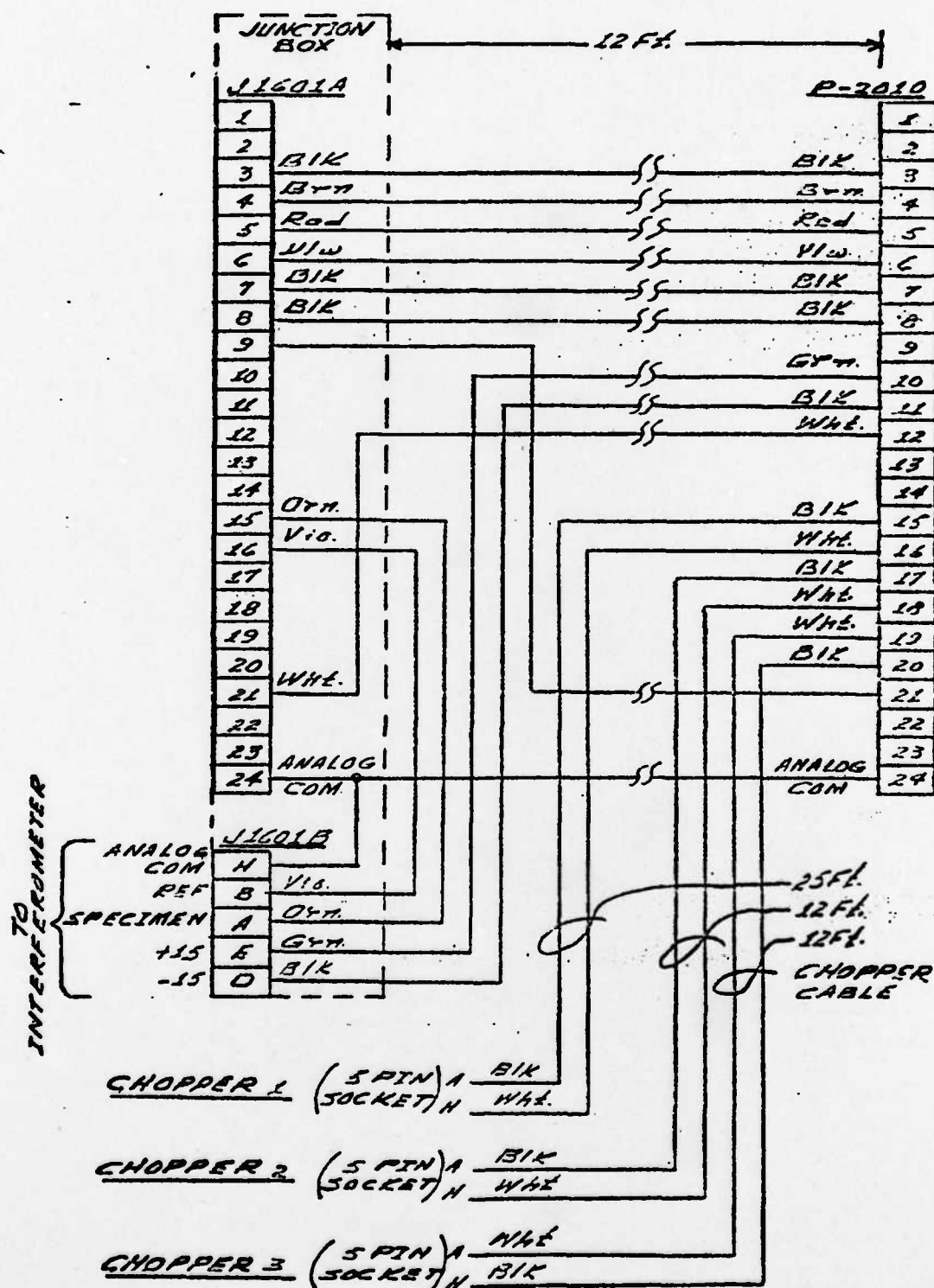
May 1975



Frame and Quad Sync Decoder Connections



Frame and Quad Sync Decoder



Frame and Quad Sync Cable

	1	13	
	2	14	
+5VDC	3	15	CHOPPER 1
#1 SYNC	4	16	CHOPPER 1-COM
+5VDC	5	17	CHOPPER 2
#2 SYNC	6	18	CHOPPER 2-COM
+5VDC	7	19	CHOPPER 3
#3 SYNC	8	20	CHOPPER 3-COM
	9	21	+5VDC
+15VDC	10	22	
-15VDC	11	23	LOGIC GND
#4 SYNC	12	24	ANALOG GND

P/J 2010

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LME